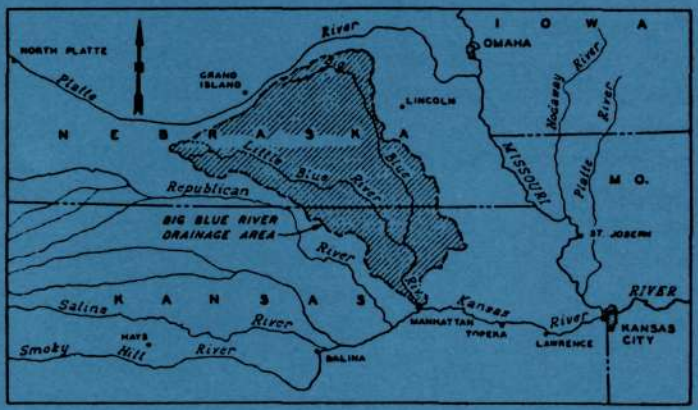
KANSAS-NEBRASKA BIG BLUE RIVER COMPACT

FIFTEENTH ANNUAL REPORT



FISCAL 1988

TOPEKA, KANSAS

MAY 10, 1988

The Honorable George Bush
President of the United States

The Honorable Mike Hayden
Governor of Kansas

The Honorable Kay A. Orr
Governor of Nebraska

Pursuant to Article VIII, Section 1 of the Rules and Regulations of the Kansas-Nebraska Big Blue River Compact Administration, I submit the Fifteenth Annual Report. The report covers activities of the Administration for Fiscal Year 1988.

KANSAS-NEBRASKA BIG BLUE RIVER COMPACT ADMINISTRATION

Maurice Kremer
Chairman

TABLE OF CONTENTS

MEMBERSHIP

Representative of the United States

Maurice Kremer, Aurora, Nebraska

Kansas Representatives

David L. Pope, Topeka[1]
Vacant

Nebraska Representatives

J. Michael Jess, Lincoln[1]
Hermann Buss, Beatrice[2]

OFFICERS

Maurice Kremer, Chairman
Carol Hans, Secretary
Denise Waters, Treasurer

COMMITTEES

Budget Committee

Tom Lamberson, Chairman
Gerald Hilmes

Engineering Committee

Robert Bishop, Chairman
James O. Bagley
Ann Bleed
Gerald Hilmes
Dale Mahan
Keith Paulsen

Legal Committee

LeRoy Sievers, Chairman, Nebraska
Leland Rolfs, Kansas

---

1 Term continuous but coincides to duties of the state official who administers water law.

2 Term expires September 19, 1989.

KANSAS-NEBRASKA BIG BLUE RIVER COMPACT ADMINISTRATION
TREASURER'S REPORT
FISCAL YEAR 1988

Balance on hand July 1, 1987:		$12,753.10
Receipts during fiscal year 1988:		
State of Nebraska	$ 5,200.00	
State of Kansas	$ 5,200.00	
Interest-Money One Account	$ 1,048.14	
Total receipts	$11,448.14	$11,448.14
Total funds available:		$24,201.24

Disbursement by the Administration July 1, 1987 to June 30, 1988:

Date	Voucher No.	Payee and Purpose	Amount
8-31-87	143	New check printing (out of printed checks)	$ 10.79
9-16-87	142	Brier-Payne Insurance (3 year Treasurer Bond)	100.00
11-12-87	144	Ali Tabidian (groundwater observations)	700.00
11-13-87	145	U.S. Geological Survey (1st Quarter)	1,800.00
1-20-88	146	Marvin W. Maydew (FY 87 audit)	392.50
1-20-88	147	U.S. Geological Survey (2nd Quarter)	1,825.00
3-25-88	148	Copycat Printers (annual report)	93.21
4-4-88	149	Carol Hans (postage)	26.55
4-6-88	150	U.S. Geological Survey (3rd Quarter)	1,825.00
5-24-88	151	Carol Hans (travel reimbursement)	30.27
6-3-88	152	Carol Hans (honorarium)	500.00
6-3-88	153	Denise Waters (honorarium)	500.00
6-15-88	154	U.S. Geological Survey (4th Quarter)	1,025.00
Total disbursements			$9,628.32

Balance on hand July 1, 1987		$12,753.10
Receipts	$11,448.14	
Disbursements	$ 9,628.32	
Balance on hand July 1, 1988		$14,572.92

MARVIN W. MAYDEW
CERTIFIED PUBLIC ACCOUNTANT
COLUMBIAN TITLE BUILDING
820 QUINCY
TOPEKA, KANSAS 66612
913 234-6673

INDEPENDENT AUDITOR'S REPORT

To the Chairman
Kansas - Nebraska Big Blue River
Compact Administration

We have audited the accompanying general purpose financial statements of the Kansas - Nebraska Big Blue River compact Administration, as of and for the years ended June 30, 1988 and 1987, as listed in the index. These financial statements are the responsibility of the Administration's management. Our responsibility is to express an opinion on these financial statements based on our audit.

We conducted our audit in accordance with generally accepted auditing standards. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audit provides a reasonable basis for our opinion.

In our opinion, the general purpose financial statements referred to above present fairly, in all material respects, the financial position of the Kansas - Nebraska Big Blue River Compact Administration as of June 30, 1988 and 1987, and the results of its operations for the years then ended in conformity with generally accepted accounting principles.

Marvin W. Maydew, CPA
Topeka, Kansas
January 12, 1989

KANSAS - NEBRASKA BIG BLUE RIVER
COMPACT ADMINISTRATION

BALANCE SHEET

June 30, 1988 and 1987

ASSETS

	1988	1987
Cash in bank	$ 14,573	$ 12,753

EQUITY

Equity:		
Fund balance	$ 14,573	$ 12,753

The accompanying notes are an integral part of these financial statements.

KANSAS - NEBRASKA BIG BLUE RIVER
COMPACT ADMINISTRATION

STATEMENT OF REVENUES, EXPENDITURES, AND
CHANGES IN FUND BALANCE

For the years ended June 30, 1988 and 1987

	1988	1987
Revenue:		
Kansas	$ 5,200	$ 4,675
Nebraska	5,200	4,675
Interest	1,048	929
Total revenue	11,448	10,279
Operating expense:		
Surface and ground water investigations	7,975	7,200
Staff travel	30	0
Auditing and accounting services	350	388
Printing annual report	93	87
Fidelity Bond	100	28
Secretary - Treasurer services	1,000	1,000
Office supplies and postage	27	489
Miscellaneous	53	77
Total operating expense	9,628	9,269
Excess of revenues over (under) expenditures	1,820	1,010
Fund balance, beginning of the year	12,753	11,743
Fund balance, end of year	$ 14,573	$ 12,753

The accompanying notes are an integral part of these financial statements.

KANSAS - NEBRASKA BIG BLUE RIVER
COMPACT ADMINISTRATION

STATEMENT OF REVENUES, EXPENDITURES, AND
CHANGES IN FUND BALANCE - BUDGET AND ACTUAL

For the years ended June 30, 1988 and 1987

	1988			1987		
	Budget	Actual	Variance Favorable (Unfavorable)	Budget	Actual	Variance Favorable (Unfavorable)
Revenues						
Kansas	$5,200	$5,200		$4,675	$4,675	
Nebraska	5,200	5,200		4,675	4,675	
Interest	0	1,048	$1,048	0	929	$929
Total revenues	10,400	11,448	1,048	9,350	10,279	929
Expenditures						
Surface and ground water investigations	8,275	7,975	300	7,200	7,200	0
Staff travel	200	30	170	200	0	200
Accounting & auditing services	350	350	0	350	388	(38)
Printing annual report	250	93	157	275	87	188
Fidelity bond	30	100	(70)	25	28	(3)
Secretary-Treasurer services	1,000	1,000	0	1,000	1,000	0
Office supplies and postage	150	27	123	150	489	(339)
Miscellaneous	145	53	92	150	77	73
Total expenditures	10,400	9,628	772	9,350	9,269	81
Excess of revenues over (under) expenditures	$0	1,820	$1,820	$0	1,010	$1,010
Fund balance, beginning of the year as previously reported		12,753			11,743	
Fund balance, end of year		$14,573			$12,753	

The accompanying notes are an integral part of these financial statements.

KANSAS - NEBRASKA BIG BLUE RIVER
COMPACT ADMINISTRATION

NOTES TO FINANCIAL STATEMENTS

June 30, 1988 and 1987

NOTE A - SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

The Kansas-Nebraska Big Blue River Compact Administration (the Administration) is an interstate administrative agency established, upon adoption of rules and regulations pursuant to Article III (3.4) of the Kansas - Nebraska Big Blue River Compact on April 24, 1973, to administer the Compact.

The accounting policies of the Administration conform to generally accepted accounting principles as applicable to governments. The following is a summary of the more significant policies.

1. Basis of Accounting

The records of the Administration are maintained on the cash basis of accounting. Under the circumstances the cash basis of accounting yields virtually the same results as would be achieved using the modified accrual basis of accounting. Their revenues are recognized when they become measurable and available as net current assets. Expenditures are made as requests for payment are received and no items are carried over from year to year.

2. Comparative Data

Comparative data for the prior year have been presented in the accompanying financial statements in order to provide an understanding of the Administration's financial position and operations.

MINUTES OF

KANSAS-NEBRASKA BIG BLUE RIVER COMPACT ADMINISTRATION ANNUAL MEETING

The annual meeting of the Kansas-Nebraska Big Blue River Compact Administration was held May 10, 1988, in Conference Room A, lower level of the Kansas State Board of Agriculture office, Topeka. Chairman Maurice Kremer called the meeting to order at 8:35 a.m. Those in attendance included:

Maurice Kremer	Compact Chairman and Federal Representative, Aurora
David Pope	Kansas Division of Water Resources, Topeka
Michael Jess	Nebraska Department of Water Resources, Lincoln
Wayland Anderson	Kansas Division of Water Resources, Topeka
James Bagley	Kansas Division of Water Resources, Topeka
Robert Bishop	Nebraska Department of Water Resources, Lincoln
Ann Bleed	Nebraska Department of Water Resources, Lincoln
Glenn Engel	U. S. Geological Survey, Lincoln
Carol Hans	Nebraska Department of Water Resources, Lincoln
Gerald Hilmes	Kansas Division of Water Resources, Topeka
Dale Mahan	Kansas Division of Water Resources, Topeka
Keith Paulsen	Nebraska Department of Water Resources, Lincoln
Leland Rolfs	Kansas Division of Water Resources, Topeka
Denise Waters	Kansas Division of Water Resources, Topeka

Minutes of Last Meeting

Michael Jess asked that in the interest of time the minutes of the last annual meeting not be read. Commissioner Pope concurred. Both Jess and Pope acknowledged that the minutes of the last meeting as printed in the 14th Annual Report had been approved.

Nebraska Report

Jess reported on the past legislative session. In conjunction with natural resources, the most significant legislative bill was the low-level waste bill. Nebraska was choosen as the site for the 5-state compact low-level waste facility. An attempt is being made to select a location for the facility.

There have been no significant changes the past year in the Little Blue NRD and Upper Big Blue NRD Ground Water Control Area rules and regulations, Jess reported.

Jess gave an update on the status of two proposed Blue River basin water projects. The Catherland and Landmark projects both propose to transfer Platte River water into the Blue River basin. The Catherland project water rights were approved in 1986, and that decision was appealed to the State Supreme Court. In a related case, the Court changed the standard of review. Subsequently, additional Catherland arguments were heard in March 1988. A

final ruling is pending. The proposed Landmark project would provide irrigation and ground water recharge to the northern part of the Blue River watershed. It is estimated that a lengthy hearing for the project will begin in the fall of 1988.

Keith Paulsen reported no water administration user requests the past year for either the Big or Little Blue rivers. Adjudication of water rights was limited to Departmental review for compliance with permit conditions and restrictions.

Kansas Report

David Pope reported on the past legislative session, including state water plan implementation. This policy plan contains recommendations on conservation, management, development, water quality, and fish and wildlife issues relative to water. Recently a number of bills regarding implementation and funding of the plan have been passed. The majority of funds have been allocated to water quality, development of recreation facilities, purchase of storage space in a federal reservoir and conservation practices. An aquifer restoration and stream recovery program for areas of severe water-level decline was also authorized along with a cost-share fund for the purchase of existing water rights from willing sellers so as to reduce the use of water in designated areas.

Pope also reported that the Legislature passed a bill requiring the filing of water use reports by water right holders each year. While these reports are currently required by the Division, the new law gives the Division more authority to enforce this requirement.

Pope reported on the development of an assurance program to provide storage regulation for water users that divert from the Kansas River. Through development of a water assurance district, a contract for storage space in Tuttle Creek Reservoir is underway.

There has been no water right regulation or grants for major water projects the past year. Dale Mahan reported that the city of Marysville is attempting to locate a ground water supply to replace their current water supply from the Big Blue River.

Secretary's Report

Carol Hans reported that the minutes of the 1987 meeting were prepared, signed by both Commissioners, and printed in the 14th Annual Report. Copies of the report were mailed.

Treasurer's Report

Denise Waters reported that the Fiscal Year 1987 Auditor's Report was completed and published in the 14th Annual Report. Discussion was held on the cost of the audit. A motion was made by Jess directing the Treasurer to obtain bids from at least three accounting firms by autumn 1988 and distribute those proposals to the Commissioners. Following review of the bids, the Commissioners will conduct a telephone conference call and select an auditor. The motion was seconded by Pope. Motion passed.

The Treasurer's Report was summarized as follows:

Funds Available	$ 24,057.86
Total Expenditures	6,773.05
Estimated Additional FY 88 Expenses	2,910.00
Estimated Interest Income	180.96
Estimated June 30, 1988, Balance	$ 14,555.77

Waters reported on three extra expenditures. The Treasurer's bond now covers a three-year period at a cost of $100. The past budget allotted $30 for a one-year bond. The increase in the annual audit fee and the purchase of check blanks were the two other unbudgeted items. A motion was made by Pope and seconded by Jess to receive the Treasurer's Report. Motion passed.

Discussion was held concerning reimbursement of the Chairman's expenses. Pursuant to Article IV, Section 4.1 of the Compact, the Chairman's expenses are to be paid by the Federal Government. Glenn Engel will attempt to obtain federal funding for the Chairman's expenses. If federal funding is unavailable, the Compact will reimburse Chairman Kremer for his travel expenses.

Engineering Committee Report

Robert Bishop distributed copies of the Engineering Committee Report. The Committee met once during the past year to review Ali Tabidian's report, Stream/Aquifer Relationships Along the Big Blue River near Beatrice, Nebraska. Bishop outlined the Committee's concerns regarding Tabidian's report. Through examination of the computer model, the Committee determined that return flows from the 17 wells (those junior to the Compact and within a mile of the thread of the stream) were not directly input. The Committee recommended (1) additional seepage runs at the sites previously used be made during low flow conditions, (2) ground water level observations at the 35 wells in the project area (those read last year by Tabidian) be collected in June, August and September, and (3) upgrading of stateline gages to provide continuous data retrieval by telephone-computer.

Following discussion of the report, the Committee was instructed to determine whether the return flows from the 17 wells were included in the model. The Committee was also instructed to use its judgement in determining the necessity and value of additional data collection.

A motion was made by Jess and amended by Pope to receive the Engineering Committee Report with the understanding that Tabidian's model is not yet considered a reliable indicator of the workings of the river and aquifer system under all flow conditions. The motion passed.

Budget Committee Report

Budget Committee Chairman Pope distributed a proposed Fiscal Year 1990 budget. Following discussion, Jess made a motion to authorize upgrading the two stateline gaging stations. Pope seconded the motion. Motion passed. The FY 89 budgeted amount for stateline gage operation was subsequently adjusted from $7,840 to $10,140.

Pope made a motion that the Compact enter into a cooperative agreement with the Lower Big Blue NRD to measure 35 observation wells three times a year at a total cost of $1,260 with the understanding that the data be provided to the Engineering Committee for retention by the Compact Administration. Motion seconded by Jess. Motion passed.

Motion was made by Jess to adopt a total FY 90 expenditure of $11,050 ($5,525 per state). Pope seconded the motion. The FY 90 budget was adopted. Pope then moved that the FY 89 budgeted amount for the observation well network be increased from $1,000 to $1,260 and the FY 89 and 90 budgets adjusted accordingly. Jess seconded the motion. Motion passed. The Fiscal Year 1990 budgeted expenses include:

Operation:	Stateline Gages	$ 7,840
	Observation Wells	1,260
Secretary Honorarium		500
Treasurer Honorarium		500
Staff Travel Expenses		200
Annual Report		100
Postage and Office Supplies		100
Annual Audit		425
Miscellaneous Expenses		125

Unfinished Business

Following discussion of committee membership, it was decided that the host state furnish the committee chairmen. Committee membership for the upcoming year is as follows:

Budget Committee: Tom Lamberson, Chairman
Gerald Hilmes

Engineering Committee: Robert Bishop, Chairman
Ann Bleed
Keith Paulsen
Gerald Hilmes
James Bagley
Dale Mahan

Legal Committee: LeRoy Sievers, Chairman
Lee Rolfs

In an attempt to clarify past discussions on records retention, Pope suggested the secretary maintain a complete set of records, and the Compact Chairman, members and committee personnel provide copies of all correspondence and documents to the secretary for the official Compact files. Pope also requested the secretary compile an index of Compact files and furnish that index to the Chairman and Compact Commissioners. Chairman Kremer and Jess agreed with Pope's suggestions.

In accordance with Article III, Section 1 of the Compact Rules and Regulations, "The principal office of the Administration shall be the office of the Secretary unless otherwise designated by the Administration." Waters' home was previously designated as the principal Administration office and the records have since been moved to Lincoln. Pope made a motion to undesignate Waters' home as the principal office and acknowledge the office of the secretary (Nebraska Department of Water Resources) as the official principal office. Motion seconded by Jess. Motion passed.

The position of Kansas representative vacated by Otis Hammett has not yet been filled. Pope will contact the Kansas Governor to encourage appointment.

Federal Agency Report

Glenn Engel reported on the two Compact gaging stations---the Big Blue River station at Barneston, Nebraska, and the Little Blue River station at Hollenberg, Kansas. A copy of Engel's report will be published in the 15th Annual Report.

New Business

Chairman Kremer and Jess conveyed their thanks to Kansas for hosting the meeting. The next annual meeting will be held May 9, 1989, in Nebraska. Kremer asked Jess to make the meeting arrangements.

Meeting adjourned.

Maurice Kremer
Compact Chairman

David L. Pope
Kansas Representative

J. Michael Jess
Nebraska Representative

USGS Report, 1987 Water Year
Kansas-Nebraska Big Blue River Compact
May 10, 1988

The USGS is presently operating two streamflow gaging stations for the Compact Administration: The Big Blue River at Barneston, Nebr., and the Little Blue River near Hollenberg, Kans. In addition to computing daily-discharge records at the two sites, telemarks were maintained for remote query of gage heights by telephone.

The average daily discharge of the Big Blue River at Barneston for the 1987 water year was 2322 cfs as compared to the average discharge for the period of record, 1933-87, of 855 cfs. The average discharge for 1987 was the second highest in the 55 years of record, only 3 cfs less than the record in 1984. The minimum daily discharge during the 1987 water year was 35 cfs on Jan. 25, when the gates at the upstream power plant were closed for about 24 hours. All daily flows, May through September, were higher than the minimum discharge required by the Compact, as the minimum flow for this period was 335 cfs on Aug. 1.

The average daily discharge of the Little Blue River near Hollenberg for the 1987 water year was 1047 cfs as compared to the average discharge for the period of record, 1975-87, of 573 cfs. The average discharge for 1987 was the second highest in the 13 years of record, 32 cfs less than the record flow in 1984. The minimum daily discharge during the 1987 water year was 170 cfs on January 18. Daily flows, May through September, were all higher than the minimum discharge required by the Compact, as the minimum flow for this period was 186 cfs September 27.

The daily records for the two gaging stations and the hydrographs of the two ground-water observation wells in Gage and Jefferson Counties, Nebraska were provided to the Compact's Engineering Committee. Current stage-discharge rating tables for the two stream gages were also provided.

The estimate of the Compact Administration's share of the cost to operate the two streamflow-gaging stations for the period July 1, 1989 to June 30, 1990, of $7,840, was given Mr. Bishop, Engineering Committee.

Report of the Engineering Committee

to

Kansas-Nebraska Big Blue River Compact Administration

May 10, 1988

Covering the Period May 12, 1987, to May 10, 1988

The Engineering Committee held one meeting during the period of this report. That meeting was held in Topeka, Kansas on February 11, 1988, and was attended by James Bagley, Gerald Hilmes, Keith Paulsen and Robert Bishop. The meeting was for the purpose of reviewing Mr. Tabidian's final report of the special Hydrogeologic Study. On the return trip to Nebraska, the Compact secretarial records were brought to Lincoln along with a five-drawer filing cabinet.

Mr. Tabidian provided three cloth-bound copies of the final Hydrogeologic Study to the Engineering Committee in early January 1988. One copy each has been provided to Mr. Jess and Mr. Pope. A third copy will be kept with the Compact records.

The Engineering Committee has examined the model described in Mr. Tabidian's report (Stream/Aquifer Relationships Along the Big Blue River near Beatrice, Nebraska) dated December 1987. The Engineering Committee recommends that the Administration accept the report and that the computer model be used as a predictive tool to determine whether the 17 wells within one mile of the thread of the Big Blue River which are junior to the date of the Compact should be regulated. The Engineering Committee's recommendation, however, has the following qualifications attached to it.

1. The computer model was calibrated during a wet period; therefore, it has not yet been determined how it will perform under low river flow conditions. The Engineering Committee can run the model to simulate dry periods; however, it will not be known how accurately it predicts the various components, such as groundwater levels and streamflow gains or losses due to pumpage of the 17 wells, without actual data collected during a low river flow period. Consequently, the Engineering Committee recommends that the groundwater levels in the 35 wells continue to be monitored. Additionally, the Engineering Committee recommends that additional seepage runs be conducted during low river flow conditions at the sites presently being used.

2. The State of Nebraska does not limit either the quantity or rate of water that may be diverted by means of the 17 wells. Also, there is no restriction on how much additional future use may result from those 17 wells. Therefore, even though the model seemed to indicate that the pumpage from the 17 wells did not significantly impact the streamflows, it is not certain whether an impact will be felt, even during wet periods, if the usage of the 17 wells should be expanded in the future.

3. It appears from our examination of the computer model that return flows from the 17 wells were not directly input. While the input of return flows should lessen the impact of the pumpage from the 17 wells on streamflow, it would be desirable to modify the model to account for this. The Engineering Committee can look into what would be necessary to modify the model to do this.

The following conclusions and recommendations are from pages 185-188 of Tabidian's report.

"A finite-element computer model of the area was constructed and the relative impact of a limited number of pumping wells on the stream flow was examined. The results of the computer model shows that while the impact of the 17 designated irrigation wells in an area within one mile from the Big Blue River is negligible on Turkey Creek, it is mathematically detectable on the Big Blue River. An increased flow of 0.32 cfs in the Big Blue River on July 22, 1984 and 0.92 cfs on September 2, 1984 was calculated as a result of simulating shutting off the 17 irrigation wells. It is important to note that the contribution of irrigation return flow to the streams was several times higher than the impact of the 17 irrigation wells on the Big Blue River flow.

RECOMMENDED FUTURE INVESTIGATION

The hydrogeologic setting of the study area is complex and the magnitude of input to and output from the stream/aquifer system can vary significantly from one year to another. Because of these variations the impact of the irrigation wells on the stream/aquifer system would be different from one year to another. The higher the precipitation, the greater the recharge and the less groundwater withdrawal during the irrigation season. Based on these facts, refinement of the computer model for the project area is always possible and the impact of irrigation wells on the stream flow should be examined for different precipitation amounts during different irrigation seasons.

Although a large amount of data was collected and the physical system was defined, more detailed data in some areas are necessary in order to improve the evaluation of the stream/aquifer relationship. Special attention should be concentrated on the data collection in the following areas for refinement of the stream/aquifer model.

The degree of hydraulic connection between the bedrock and unconsolidated deposits is not known. During the simulation of water levels, the model required more recharge in the northern and southern portion of the area where the underlying bedrock is Dakota Sandstone. Furthermore, imposing some measured baseflows on the upper portions of the Big Blue River, without considering the upward movement of the water into unconsolidated deposits, created some problems (calculated water levels were significantly lower than observed water levels and could not be simulated with a reasonable recharge rate). The quantity of leakage of water from bedrock into unconsolidated material may be significant.

Stream loss to and stream gain from the aquifer are important components in simulation of groundwater flows. Future work on seepage runs should be concentrated on Turkey Creek and the Big Blue River during drier seasons. The stream/aquifer interconnection of the other creeks in the area and their loss or gain quantity are not significant.

During the course of this study, a series of mass water-level measurements under various hydrologic conditions were conducted and water-level maps were prepared for various seasons of the year. Due to the fact that the average precipitation has been higher than normal in the area for the past several years, further mass water-level measurements, especially under drier conditions, is recommended.

There is a close interrelationship in the model among the stream stage, groundwater level, baseflow, groundwater withdrawal, evapotranspiration, recharge (from precipitation and irrigation return flow), and stream characteristics. Improvement in quantification and a better understanding of any of these factors should contribute to a better estimation of the impact of irrigation wells on the stream flows."

During 1987, Mr. Tabidian collected ground water level observations at 35 sites in the project area. The observations were taken three times, in June for pre-irrigation conditions, in August during irrigation, and in September for the post-irrigation conditions. This was done as per contract with the Compact Administration. A copy of the observed values is attached to this report and identified as Exhibit A. A column has been added showing the change between pre-irrigation and post-irrigation conditions.

Examination of Nebraska's well registration records shows that in 1987, one municipal well was registered within the regulatory area of the Little Blue River basin. No wells were registered in the regulatory reach of the Big Blue River. Maps were updated accordingly.

The Lower Big Blue Natural Resources District was contacted regarding the possibility of their collection of three observations per year of the 35 wells. They have offered to collect the data at a cost of $12 per observation.

On October 20 and 21, 1987, Kansas and Nebraska employees made 15 current meter measurements in the Beatrice area for Big Blue River seepage investigation purposes. Attached is a report of those measurements identified as Exhibit B. This effort is to be duplicated again next year in the October period and also if low flows occur earlier in the irrigation season.

Attached as part of this report are the daily discharge values of the stateline flows for the 1987 water year (Exhibits C and D) and updated ground water well hydrographs (Exhibits E and F) of a well near Fairbury and one north of Beatrice, all provided by the U. S. Geological Survey. The USGS also

advises the total cost to operate the stateline gages for water year 1990 will be the same as for 1989 at $15,680---the Compact cost to be one-half of this amount. Stage-discharge rating tables of current channel capacity conditions have been provided by USGS for use during the coming year.

The Committee has discussed and recommends that the stateline gages be upgraded with newer electronic equipment which will provide for continuous record retrieval by telephone-computer access to both Kansas and Nebraska.

Respectfully submitted,

Robert F. Bishop

James O. Bagley

Keith A. Paulsen

Gerald E. Hilmes

Location	Well Type	Land Surface Elevation (Feet)	Depth to Static Water Level (Feet) 6/7/87 (Pre-Irr.)	8/11/87 (Irr.)	9/19/87 (Post-Irr.)	Change Pre-Irr. Post-Irr.
4N-5E-2aaaa	OW	1345.0	86.6	88.7	89.8	-3.2
4N-5E-2cbbb	OW	1271.5	13.3	17.1	16.0	-2.7
4N-5E-2cbbb	OW	1271.0	7.0	7.0	42.3?	?
4N-5E-3cdbc	IW	1271.0	20.1	22.0	20.0	+0.1
4N-5E-4bbbc	IW	1286.0	13.9	20.7	20.0	-6.1
4N-5E-4aaaa	OW	1273.5	9.5	13.8	11.3	-1.8
4N-5E-7bbaa	IW	1361.0	81.0	87.1	83.4	-2.4
4N-5E-9cbcc	IW	1340.0	68.6	75.3	70.8	-2.2
4N-5E-11cccc	OW	1276.0	18.9	22.2	21.1	-2.2
4N-5E-11daca	IW	1262.0	12.9	15.9	13.8	-0.9
4N-5E-12cccd	OW	1261.0	8.4	11.6	10.0	-1.6
4N-5E-12bbba	IW	1279.0	21.0	24.3	22.7	-1.7
4N-5E-14abbb	IW	1266.0	8.2	13.5	10.8	-2.6
4N-5E-14dddd	OW	1275.0	16.5	17.2	17.6	-1.1
4N-5E-22bccc	IW	1337.0	67.0	72.2	69.4	-2.4
4N-5E-25aacd	IW	1274.0	16.2	--	16.9	-0.7
4N-6E-6cbbb	IW	1351.0	91.8	91.3	90.3	+1.5
4N-6E-8aabb	IW	1352.0	92.4	93.7	93.2	-0.8
4N-6E-18ddcc	OW	1264.0	4.7	4.4	4.6	+0.1
5N-4E-12abba	IW	1305.0	12.8	16.8	15.4	-2.6
5N-4E-13badd	IW	1285.0	10.5	12.2	12.1	-1.6
5N-4E-15dbbb	IW	1299.0	12.4	18.7	16.1	-3.7
5N-4E-22dccc	IW	1341.0	44.1	47.6	46.0	-1.9
5N-4E-23babb	IW	1292.0	9.3	15.4	13.0	-3.7
5N-4E-24aacd	IW	1290.0	12.4	18.4	16.8	-4.4
5N-4E-25ddaa	IW	1331.0	44.5	46.4	45.6	-1.1
5N-5E-7cadd	IW	1344.0	56.8	66.5	61.3	-4.5
5N-5E-16cbba	IW	1352.0	70.5	92.3	75.7	-5.2
5N-5E-17abbb	IW	1330.0	38.7	56.9	45.4	-6.7
5N-5E-17cdaa	OW	1347.0	61.0	79.9	64.4	-3.4
5N-5E-20bccd	IW	1286.0	14.5	--	--	--
5N-5E-21ddbb	IW	1333.0	48.3	54.9	52.7	-4.4
5N-5E-29cbbb	IW	1281.0	5.3	10.0	8.6	-3.3
5N-5E-33aadd	IW	1281.0	13.4	18.6	16.0	-2.6
5N-5E-35abbb	IW	1362.0	99.1	102.4	100.8	-1.7

IW = Irrigation Well
OW = Observation Well

Exhibit B

BIG BLUE RIVER SEEPAGE INVESTIGATION

Current Meter Measurements
October 1987

	Oct. 20-21 (cfs)
Big Blue River 1.5 miles north of DeWitt in SW¼NE¼ of 12-5-4E	210.00
Clatonia Creek 1 mile northeast of DeWitt in NW¼NW¼ of 17-5-5E	2.10
Turkey Creek 1.5 miles west of DeWitt in SE¼NW¼ of 15-5-4E	43.00
Turkey Creek .5 mile south of DeWitt in SE¼NW¼ of 24-5-4E	45.00
Turkey Creek 1.5 miles southeast of DeWitt in NW¼SW¼ of 29-5-5E	43.00
Big Blue River 2.5 miles southeast of DeWitt in NW¼NE¼ of 33-5-5E	269.00
Soap Creek 3.5 miles southeast of DeWitt in SE¼SW¼ of 27-5-5E	0.48
Unnamed tributary to Big Blue River 1 mile north of Hoag in NW¼NE¼ of 10-4-5E	0.00
Snake Creek 2 miles northeast of Hoag in NW¼NW¼ of 1-4-5E	0.00
Big Blue River 1 mile east of Hoag in NE¼NW¼ of 13-4-5E	280.00
Cub Creek 2 miles south of Hoag in SW¼SW¼ of 24-4-5E	3.00
Bottle Creek 1.5 miles northwest of Beatrice in NW¼SW¼ of 30-4-6E	0.21
Unnamed tributary to Big Blue River 5 miles northwest of Beatrice in SW¼SW¼ of 30-4-6E	0.32
Indian Creek at Beatrice in SE¼SE¼ of 28-4-6E	3.40
Big Blue River at Beatrice in SW¼NW¼ of 3-3-6E	292.00

UNITED STATES DEPARTMENT OF THE INTERIOR - GEOLOGICAL SURVEY - NEBRASKA DISTRICT 04/15/88

STATION NUMBER 06882000 BIG BLUE R AT BARNESTON NEBR STREAM SOURCE AGENCY USGS
LATITUDE 400311 LONGITUDE 0963516 DRAINAGE AREA 4444.00 DATUM 1162.20 STATE 31 COUNTY 067
PROVISIONAL DATA SUBJECT TO REVISION
DISCHAPGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1986 TO SEPTEMBER 1987
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4010	1070	530	538	524	562	6450	911	3540	4010	335	3060
2	4450	983	562	495	430	597	6960	884	4200	3320	339	1520
3	2760	1080	605	493	423	552	6550	888	5340	2790	357	924
4	3530	1080	616	485	432	514	5620	944	5940	2390	348	756
5	2710	932	580	482	444	471	5410	1050	3550	1770	339	808
6	1700	818	558	496	440	447	5610	1420	1810	1310	338	389
7	1280	765	790	488	438	415	5680	1380	1310	1180	360	566
8	962	1370	2060	475	439	389	5240	1600	1050	1180	864	508
9	771	*2000*	*1920*	*477*	*434*	*370*	*4460*	*1850*	*1430*	*1960*	*1200*	457
10	653	1200	900	480	429	374	3760	1590	4210	2090	826	633
11	9510	1000	720	434	425	364	2990	1230	4570	1600	662	759
12	20100	800	640	468	423	356	2430	986	4510	1380	1060	637
13	21500	700	620	446	419	355	2080	868	2360	1590	962	724
14	19800	679	646	473	421	355	9640	803	1710	1200	864	724
15	12200	663	641	484	422	354	15900	743	1200	975	4290	1210
16	7960	695	616	430	421	358	12400	694	980	805	2710	3440
17	3990	728	721	400	415	485	8440	663	864	673	1490	3100
18	2470	722	794	360	401	5290	5850	644	3760	605	2200	1570
19	1790	709	712	400	397	7390	3330	645	6360	571	2070	1870
20	1370	619	603	430	395	5730	2300	677	5950	552	2970	1710
21	1170	633	627	480	382	4990	2010	697	3220	522	1440	1160
22	1060	628	589	480	379	3930	1660	664	1840	571	1730	861
23	1030	612	571	450	378	7830	1420	617	2290	614	1590	743
24	1230	574	566	300	380	20900	1310	700	1870	535	1030	648
25	1540	587	559	35	386	35300	1230	791	1690	477	743	544
26	3240	566	555	300	382	35300	790	1390	1910	433	697	472
27	3950	544	541	400	392	32500	994	7620	1490	407	1280	428
28	3030	537	555	405	440	27100	1020	7180	980	378	3810	404
29	2240	533	525	432	---	21000	988	5400	7210	369	4830	407
30	1660	523	527	440	---	13500	945	3490	4990	363	5290	404
31	1300	---	912	506	---	5260	---	2410	---	349	4900	---
TOTAL	144966	24350	22361	13462	11691	233338	133467	51429	92134	36969	51924	31436
MEAN	4676	812	721	434	418	7527	4449	1659	3071	1193	1675	1048
MAX	21500	2000	2060	538	524	35300	15900	7620	7210	4010	5290	3440
MIN	653	523	525	35	378	354	790	617	864	349	335	389
AC-FT	287500	48300	44350	26700	23190	462800	264700	102000	182700	73330	103000	62350

CAL YR 1986 TOTAL 666250 MEAN 1825 MAX 26700 MIN 215 AC-FT 1322000
WTR YR 1987 TOTAL 847527 MEAN 2322 MAX 35300 MIN 35 AC-FT 1681000

Telemark Telephone No.: (402) 674-3125
(Gage House)

State Line Compact Flow Schedules

May	45 c.f.s.
June	45 c.f.s.
July	80 c.f.s.
August	90 c.f.s.
September	65 c.f.s.

Exhibit D

UNITED STATES DEPARTMENT OF THE INTERIOR - GEOLOGICAL SURVEY - NEBRASKA DISTRICT 04/15/88

STATION NUMBER 06884025 LITTLE BLUE R AT HOLLENBERG, KS STREAM SOURCE AGENCY USGS
LATITUDE 395848 LONGITUDE 0970016 DRAINAGE AREA 2752.00 DATUM 1216.10 STATE 20 COUNTY 201
PROVISIONAL DATA SUBJECT TO REVISION

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1986 TO SEPTEMBER 1987
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4020	454	294	286	276	300	1960	579	627	2110	293	285
2	2060	455	319	279	262	290	2560	557	1140	1330	296	274
3	828	503	320	276	256	280	2950	630	2280	883	286	296
4	763	633	306	276	266	259	2740	1950	1200	654	296	299
5	748	566	289	276	252	247	2660	5240	689	567	272	259
6	550	493	288	276	252	257	2530	8260	589	486	276	262
7	422	457	364	276	246	245	2300	3860	494	434	314	266
8	349	584	565	272	240	248	2050	2140	455	490	595	263
9	308	653	550	272	240	247	1750	1500	480	558	772	267
10	295	600	330	272	236	230	1480	1100	663	762	521	1430
11	5970	270	360	252	236	227	1390	882	1020	558	455	885
12	16200	300	330	262	233	237	1210	762	872	548	366	485
13	14600	300	340	286	236	246	1070	696	728	468	382	374
14	5540	300	350	279	233	258	5690	637	643	398	336	322
15	2350	350	372	260	239	255	13300	603	598	386	553	322
16	1460	361	379	230	236	257	10000	563	526	355	614	410
17	1040	351	378	190	230	350	3890	525	472	347	572	347
18	824	347	378	170	230	2370	2040	495	422	366	934	250
19	729	346	372	175	227	3920	1500	517	460	390	624	232
20	640	335	359	195	230	2230	1200	515	755	374	398	241
21	585	328	340	200	233	1530	1030	512	601	730	347	227
22	565	322	325	210	227	996	917	510	455	735	502	220
23	856	317	296	215	227	8280	849	532	543	567	789	203
24	885	307	300	220	227	23200	789	515	375	468	656	202
25	750	305	300	230	229	26000	730	683	349	438	490	197
26	755	297	296	250	230	13500	684	1920	351	394	394	200
27	766	290	296	265	236	4860	649	2700	340	382	391	186
28	640	286	293	290	256	3280	619	1740	344	347	386	209
29	562	288	290	320	---	2070	605	1170	438	314	360	219
30	508	285	286	307	---	1380	595	826	3230	300	321	201
31	476	---	286	276	---	1310	---	700	---	300	299	---
TOTAL	67044	11683	10551	7843	6721	99359	71737	43819	22139	17439	14090	9833
MEAN	2163	389	340	253	240	3205	2391	1414	738	563	455	328
MAX	16200	653	565	320	276	26000	13300	8260	3230	2110	934	1430
MIN	295	270	286	170	227	227	595	495	340	300	272	186
AC-FT	133000	23170	20930	15560	13330	197100	142300	86910	43910	34590	27950	19500

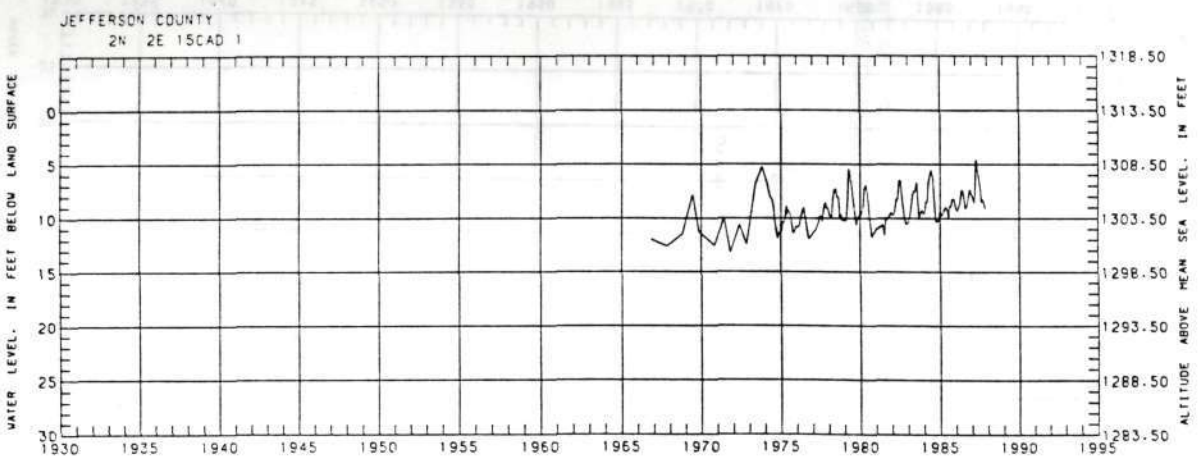
CAL YR 1986 TOTAL 242885 MEAN 665 MAX 16200 MIN 155 AC-FT 481800
WTR YR 1987 TOTAL 382258 MEAN 1047 MAX 26000 MIN 170 AC-FT 758200

Telemark Telephone No.: (913) 337-2949
(Gage House)

State Line Compact Flow Schedules

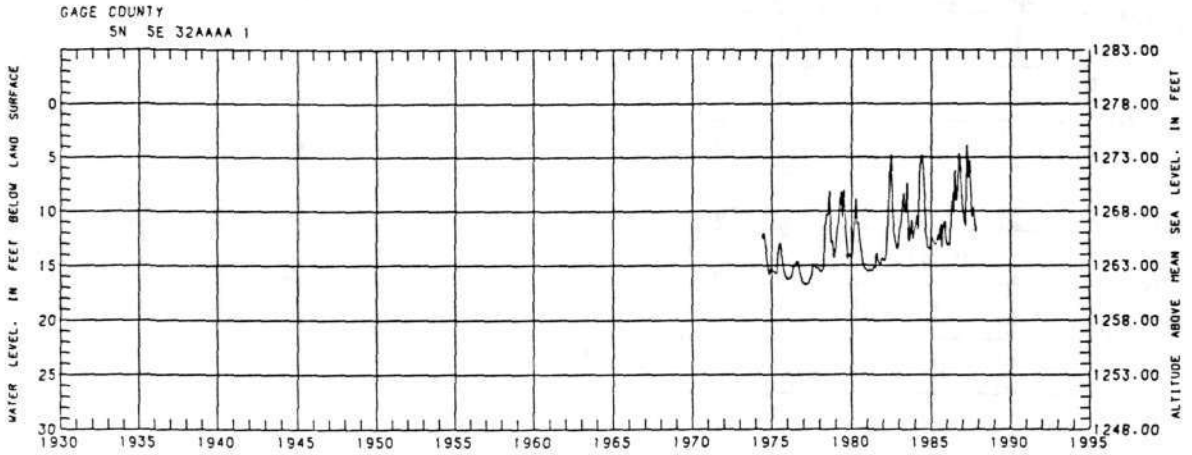
May	45 c.f.s.
June	45 c.f.s.
July	75 c.f.s
August	80 c.f.s.
September	60 c.f.s.

Exhibit E



¼ Mile East of the Little Blue River and About

Midway between the River and the Town of Fairbury



½ Mile Southwest of the Big Blue River

5 Miles West and 6 Miles North of Beatrice

REPORT OF THE WATER LEVEL MEASUREMENTS TO THE ENGINEERING COMMITTEE OF THE BIG BLUE RIVER COMPACT

Ali Tabidian

October 20, 1987

Location	Well Type	Land Surface Elevation (Feet)	Depth to Static Water Level (Feet) 6/7/87 (Pre-Irr.)	8/11/87 (Irr.)	9/19/87 (Post-Irr.)
4N-5E-2aaaa	OW	1345.0	86.6	88.7	89.8
4N-5E-2cbbb	OW	1271.5	12.3	17.1	16.0
4N-5E-2cbbb	OW	1271.0	7.0	7.0	42.37
4N-5E-3cdbc	IW	1271.0	20.1	22.0	20.0
4N-5E-4bbbc	IW	1286.0	13.9	20.7	20.9
4N-5E-4aaaa	OW	1273.5	9.5	13.8	11.3
4N-5E-7bbaa	IW	1361.0	81.0	87.1	83.4
4N-5E-9cbcc	IW	1340.0	68.6	75.3	70.8
4N-5E-11cccc	OW	1276.0	18.9	22.2	21.1
4N-5E-11daca	IW	1262.0	12.9	15.9	12.8
4N-5E-12cccd	OW	1261.0	8.4	11.6	10.0
4N-5E-12bbba	IW	1279.0	21.0	24.3	22.7
4N-5E-14abbb	IW	1266.0	8.2	13.5	10.6
4N-5E-14dddd	OW	1275.0	16.5	17.2	17.6
4N-5E-22bccc	IW	1337.0	67.0	72.2	69.4
4N-5E-25aacd	IW	1274.0	16.2	---	16.9
4N-6E-6cbbb	IW	1351.0	91.8	91.3	90.3
4N-6E-8aabb	IW	1352.0	92.4	93.7	92.2
4N-6E-18ddcc	OW	1264.0	4.7	4.4	4.6
5N-4E-12abba	IW	1305.0	12.8	16.8	15.4
5N-4E-13badd	IW	1285.0	10.5	12.2	12.1
5N-4E-15dbbb	IW	1299.0	12.4	18.7	16.1
5N-4E-22dccc	IW	1341.0	44.1	47.6	46.0
5N-4E-23babb	IW	1292.0	9.3	15.4	13.9
5N-4E-24aacd	IW	1290.0	12.4	18.4	16.9
5N-4E-25ddaa	IW	1331.0	44.5	46.4	45.6
5N-5E-7cadd	IW	1344.0	56.8	66.5	61.3
5N-5E-16cbba	IW	1352.0	70.5	92.3	75.7
5N-5E-17abbb	IW	1330.0	38.7	56.9	45.4
5N-5E-17cdaa	OW	1347.0	61.0	79.9	64.4
5N-5E-20bccd	IW	1286.0	14.5	---	---
5N-5E-21ddbb	IW	1333.0	48.3	54.9	52.7
5N-5E-29cbbb	IW	1281.0	5.3	10.9	8.6
5N-5E-33aadd	IW	1281.0	13.4	18.6	16.0
5N-5E-35abbb	IW	1362.0	99.1	102.4	100.2

IW= Irrigation Well
OW= Observation Well

In order to re-evaluate the stream/aquifer relationships and to update and improve the computer model of the northwest Beatrice area, the following data are required:

1) Water-level maps for various seasons of the year (pre-irrigation, irrigation, and post-irrigation)

2) Aquifer loss or gain along the streams

3) Stream stage

4) Water use (Irrigation and Municipal)

5) Recharge and evapotranspiration

6) Stream bed leakance

7) Hydraulic interconnection of the bedrock units and overlying unconsolidated deposits

8) Updating the geologic and hydrogeologic factors (bedrock, transmissivity, storage coefficient, etc.)