Approved: March 9, 2004
Date

MINUTES OF THE HOUSE ENVIRONMENT COMMITTEE

The meeting was called to order by Chairperson Joann Freeborn at 3:30 p.m. on February 3, 2004 in Room 231-N of the Capitol.

All members were present except:
Representative John Faber- excused

Committee staff present:
Emalene Correll Legislative Research Department
Raney Gilliland Legislative Research Department
Mary Torrence, Revisor of Statutes
Mary Ann Graham, Committee Secretary

Conferees appearing before the committee: Mary Jane Stankiewicz, Administrator, Kansas Agricultural Remediation Board, 816 SW Tyler, Topeka, KS 66612
David L. Pope, Chief Engineer, Division of Water Resources, Department of Agriculture, 109 SW 9th, Topeka, KS 66612-1283

Others attending:
See Attached List.

Vice-Chairman Lee Tafanelli called the meeting to order for Chairperson Joann Freeborn, who was testifying in another committee. He asked if anyone wished to request a bill. No one came forward.

The Chairman recognized Raney Gilliland, Legislative Research Department. He gave a brief summary on the background and responsibilities of the Kansas Agricultural Remediation Board.

Chairman Lee Tafanelli welcomed Mary Jane Stankiewicz, Administrator of the Kansas Agricultural Remediation Board (KARB). She presented the Annual Report for 2003 to the committee. The 2000 Legislature passed **SB501**, which was titled Agricultural and Specialty Chemical Remediation Act. This bill created the following programs and board: (1) Remediation Linked Deposit Loan Program. This program is to be administered by the state treasurer for the purpose of providing lower interest loans to eligible persons to pay the costs of corrective action approved or ordered by the Kansas Department of Health and Environment (KDHE). (2) Remediation Reimbursement Program. This program is administered by the Kansas Agricultural Remediation Board and provides reimbursement to eligible persons for the costs of corrective actions approved by KDHE or taken in accordance with an order from KDHE. (3) Kansas Agricultural Remediation Board. Five members are appointed by the Governor and confirmed by the Senate and two ex officio members representing KDHE and Kansas Department of Agriculture (KDA). These Board members will serve four year terms. The Board has the following authority and responsibilities: Promulgate rules and regulations; Contract or hire an administrator; Provide an annual audit of the fund; Provide an annual report to the Governor, the Senate Energy and Natural Resources Committee, and the House Environment Committee on or before February 1, of each year; and The Board and the Fund shall be subject to an annual audit by the legislative post audit committee. (See attachment 1) Committee questions and discussion followed.

Chairman Tafanelli thanked Ms. Stankiewicz for her annual report.

Chairperson Joann Freeborn welcomed David Pope, Chief Engineer, Division of Water Resources, Kansas Department of Agriculture (KDA). Mr. Pope presented a review, with the use of overhead slides, on Water Issues involving the Circle K-Ranch, to the committee. He provided information regarding the water aspects of the proposed state acquisition of the Circle K-Ranch in Edwards County. He answered a series of questions provided to him earlier by the committee staff. The Circle K-Ranch is located just southwest of Kinsley immediately adjacent to the Arkansas River in an area often referred to as the "Middle Arkansas River" sub basin. As defined, the middle Arkansas River sub basin is that portion of the river basin from the Ford-Edwards county line to the confluence of the Arkansas River and Rattlesnake Creek, just east of Great Bend, all within Big Bend Groundwater Management District No. 5

in south central Kansas. The area just upstream is considered the Upper Arkansas River sub basin. Its boundaries run from the Colorado-Kansas state line to the Ford-Edwards County line, most of which is in the Southwest Kansas Groundwater Management District No. 3. The Circle K-Ranch has 57 wells authorized to pump 8,039 acre-feet of water on 5,366 acres by 30 water rights. Forty-seven of the wells are located within 1.25 miles of the Arkansas River. The average reported water use on the ranch from 1989 to 2000 is 6,643 acre-feet. The proposal is to retire, or dismiss, most of the existing water rights over a period of approximately eight to 10 years as land use is converted to mostly native grasses, which would not require irrigation. The proposal does not include a change in purpose of use. The specific amount that may be retained in irrigated production has not been determined, and it is being considered as part of the overall project implementation, with interagency involvement, an advisory committee and public input. Retaining as amount of roughly 1,000 acre-feet to irrigate four or five irrigation circles generally located the greatest distance from the river is one possibility. From a hydrological standpoint, the larger the reduction, the greater the benefit to the stream-aquifer system. Restoring base flow will be long term, require normal climatic conditions to raise water levels and require a regional reduction in groundwater pumping. The retirement of the Circle K-Ranch water rights would provide a significant reduction in groundwater use in an area historically experiencing groundwater declines and contributing to depletion of the river's base flow. (See attachment 2) Committee questions and discussion followed.

Chairperson Freeborn thanked Mr. Pope for his presentation. She reviewed the committee agenda for Thursday, February 5, a hearing on **HB2607** - Solid waste permits; preliminary site evaluation; time limits for review of applications; permit fees.

The meeting adjourned at 5:15 p.m. The next meeting is scheduled for Thursday, February 5, 2004.

HOUSE ENVIRONMENT COMMITTEE

DATE February 3, 2004

NAME	REPRESENTING
David L Pope	KDA
Kent Askren	KFB
Dale Lambley	KDA
Steve Adams	KDWP
Chris Tymeson	KDWP
LeAnn Schmitt	KDWP
Joe HARKINS	Ks WATER OFFICE
Duane Stuever	Kansas Coop Council
MATTHEW K YODER	YODER MEATS
John m yoder	yoder meats co.
Alex Kotsiopoulos	Milford Lake, State Park
Steve Swaffar	KFB
Jesse McCurry	Commerce
Duane Mathes	Edwards County
DAN WARD	KS WILDLIFE FDTN
Laura Wood	Intern
TINA Alder	KDA
Mary Jane Stankiewicz	KGFA/KARA/KARB
Ken Grotewiel	KS Water Office
Judy Shaw	Waste Mgmt of Ks
BILL BRADY	City of Hays
TOM KNIEPL	ARKANSAS RIVER COALITION
Woody Moses	KAPA
Wesley Harms	KAPA

K A N S A S

AGRICULTURAL REMEDIATION BOARD

KATHLEEN SEBELIUS, GOVERNOR

KANSAS AGRICULTURAL REMEDIATION BOARD

ANNUAL REPORT FOR 2003

HOUSE ENVIRONMENT COMMITTEE

MARY JANE STANKIEWICZ

JANUARY 30, 2004

816 SW TYLER TOPEKA, KS 66612 785-440-0356 FAX 785-234-2930 www.karb.org

House Environment
2-3-04
Attachment 1

The Genesis

The 2000 Legislature passed SB 501, which was entitled the Agricultural and Specialty Chemical Remediation Act. This bill created the following programs and board:

1. Remediation Linked Deposit Loan Program - This program is to be administered by the state treasurer for the purpose of providing lower interest loans to eligible persons to pay the costs of corrective action approved or ordered by the Kansas Department of Health and Environment.
    - The costs must also be approved by the Kansas Agricultural Remediation Board (KARB).
    - The total amount of linked deposit loans for any one site cannot exceed $300,000.
    - The total amount of money in the linked deposit program shall not exceed $5 million.
    - This provision will sunset in 10 years.

2. Remediation Reimbursement Program - This program is administered by the Kansas Agricultural Remediation Board (KARB). This program provides reimbursement to eligible persons for the costs of corrective actions approved by KDHE or taken in accordance with an order from KDHE.
    - If an eligible person is assessed a fee then that person can receive 90% of the total costs greater than $1,000 and less than $100,000 **plus** 80% of the total eligible corrective action costs greater than $100,000 and less than $200,000.
    - If a person does not pay an assessment or a pesticide dealer that sells less than $2500 of pesticides annually, then the person is eligible to receive 100% of their costs greater than $1,000 and less than or equal to $10,000.
    - This provision sunsets in 10 years.

3. Kansas Agricultural Remediation Board (KARB) – 5 members are appointed by the Governor and confirmed by the Senate and two ex officio members representing KDHE and KDA. These Board members will serve 4 year terms. The Board has the following authority and responsibility:
    - Promulgate rules and regulations;
    - Contract or hire an administrator;
    - Provide an annual audit of the fund;
    - Provide an annual report to the Governor, the Senate Energy and Natural Resources Committee and the House Environment Committee on or before February 1, of each year;
    - The Board and the Fund shall be subject to an annual audit by the legislative post audit committee.

Kansas Agricultural Remediation Board (KARB)

Linda Peterson, Chair
Representing agricultural producers
Term expired: 2003*

Larry Shivers, Vice Chair until September 2003 when he was then named Chair
Representing specialty chemical distributors
Term expires: 2004

Kamyar Manesch
Representing grain processors
Term expires: 2003*
* Has received confirmation by the Senate Confirmation Oversight Committee on December 16, 2003 to serve another four years on the Board

Laura Pearl
Representing agricultural retailers
Term expires: 2006

Roger Long
Representing agriculture and specialty chemical registrants
Term expires: 2006

Tim Peterson
Representing Agricultural Producers
* Has received confirmation by the Senate Confirmation Oversight Committee on December 16, 2003 to fill the position vacated by Linda Peterson

Rick Bean, ex-officio member
Representing the Kansas Department of Health and Environment

Gary Meyer, ex-officio member
Representing the Kansas Department of Agriculture

KARB Receipts

Who Pays	FY 2002	FY 2003	Estimated FY 2004
Pesticide Product	387,750.00	382,970.00	372,000.00
Grain Storage	406,493.48	399,260.00	396,000.00
Pesticide Business Dealer License	99,560.00	87,705.00	87,680.00
Fertilizer Products	66,960.00	75,100.00	68,000.00
Custom Fertilizer Blenders	42,400.00	44,300.00	41,500.00
Total	1,046,425.42	989,335.00	965,180.00

Reimbursements

During 2003, the Board reimbursed met 4 times and approved 74 eligible applicants for expenses that totaled $1,373,492.78. The average reimbursement amount was $18,560.71. The number of applications has increased by 375% over the last year, however the average amount that was reimbursed decreased by over 50%. Over the past two years the Board has approved applicants that had contaminated sites in Kansas for expenses that totaled $2,312,601.75.

2003 KARB REIMBURSEMENT CHART

Business	Contamination	Reimbursement
Distributor	Pesticide and nitrates	$3511.67
Ag retailer	Nitrates and herbicides	$30,000.00
Elevator	Carbon tet	$49,414.23
Manufacturer, distributor, retailer	Pesticides and Nitrates	170,000.00
Ag retailer	Nitrate and ammonia	$9,392.86
Ag retailer/elevator	Pesticides and Atrazine	$6233.88

Ag retailer/elevator	Nitrate	$21,994.75
Ag retailer/elevator	Nitrate	$11,986.44
Elevator	Carbon Tet	$11765.05
Ag Retailer	Nitrates	$29,370.46
Elevator/ag retailer	Carbon tet	$47,445.23
Elevator/ag retailer	Nitrate	$13,172.46
Elevator/ag retailer	Nitrate	$3228.21
Elevator/ag retailer	Carbon tet	$19,616.66
Elevator	Carbon tet	$9375.32
Elevator	Carbon tet	$41,864.07
Elevator/Ag retailer	Nitrate	$10,000.00
Elevator/Ag retailer	Nitrate and pesticide	$10,000.00
Elevator/Ag retailer	Nitrate/pesticides and carbon tet	$10,000.00
Elevator/Ag retailer	Nitrate and pesticide	$10,000.00
Elevator/Ag retailer	Nitrate and pesticides	$10,000.00
Elevator/Ag retailer	Nitrate and pesticides	$10,000.00
Elevator/Ag retailer	Nitrate and pesticides	$10,000.00
Elevator	Nitrate	$10,000.00
Elevator/Ag retailer	Nitrate and pesticides	$10,000.00
Elevator	Nitrate	$10,000.00

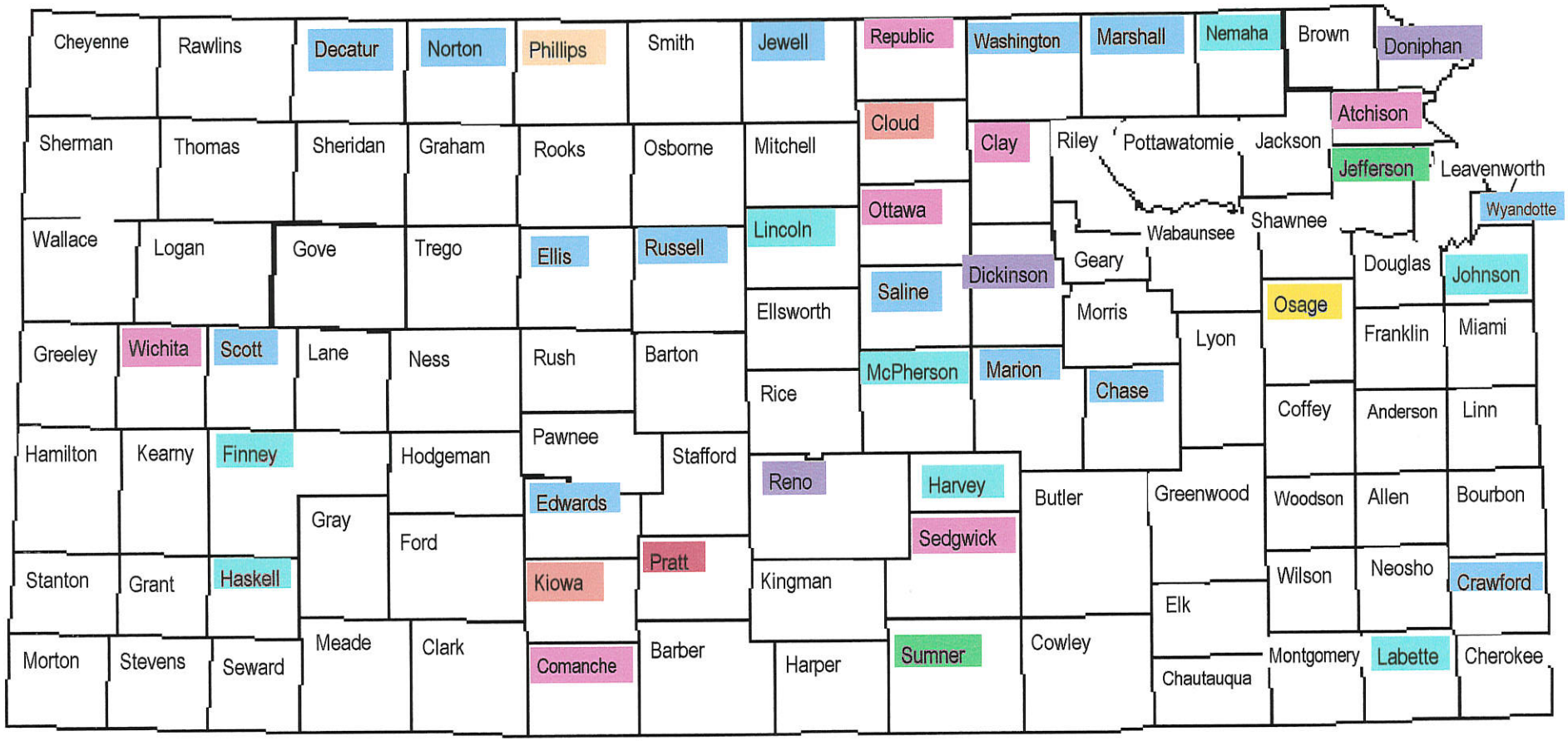
Elevator/Ag retailer	Carbon Tet	$18,706.73
Elevator/ Ag retailer	Nitrate	$8,371.72
Elevator/Ag retailer	Nitrate	$23,917.19
Ag retailer	Nitrate	$6354.60
Elevator/Ag retailer	Carbon tet	$18,300.88
Elevator/Ag retailer	Nitrate and carbon tet	$4825.98
Elevator/Ag retailer	Nitrate	$18,503.20
Elevator/Ag retailer	Nitrate, pesticides and ammonia	$18,182.92
Elevator/ Ag retailer	Nitrate	$26,137.65
Elevator/Ag retailer	Nitrate	$13,549.60
Elevator/Ag retailer	Nitrate and pesticides	$1991.96
Elevator/Ag retailer	Nitrate	$2847.38
Elevator/Ag retailer	Nitrate	$2890.49
Elevator/Ag retailer	Nitrate	$3035.42
Elevator/Ag retailer	Nitrate and Carbon Tet	$22888.67
Elevator/Ag retailer	Pesticides and Nitrate	$7104.74
Elevator/Ag retailer	Nitrate	$18,494.11
Elevator	Carbon tet	$1054.49
Elevator	Carbon tet	$3250.31
Elevator	Carbon Tet	$106,691.13

Railroad	Nitrate	$10,000.00
Railroad	Carbon Tet	$10,000.00
Ag retailer	Nitrate	$6912.45
Ag retailer and Elevator	Nitrate	$17,102.98
Ag retailer	Pesticides	$30,000.00
Ag retailer	Carbon tet & nitrates	$58,631.07
Comercial Applicator	Nitrates	$45,653.45
Ag retailer	Nitrates	$4973.33
Ag retailer & Elevator	Carbon Tet	$45,086.57
Ag retailer & Elevator	Nitrates	$19,605.29
Ag retailer	Nitrates	$8,639.28
Ag retailer & Elevator	nitrates	$5340.91
Ag retailer & Elevator	Nitrates	$4173.98
Ag retailer & Elevator	Nitrates	$4514.44
Ag retailer & Elevator	Carbon tet & Nitrates	$13,588.25
Ag retailer & Elevator	Carbon tet & Nitrates	$25,345.47
Ag retailer & Elevator	Nitrates	$22,934.12
Commercial Application	Nitrates	$3003.03
Non-ag site	Nitrates	$10,000.00
Ag retailer & Elevator	Carbon tet	$8935.39
Ag retailer & Elevator	Nitrates	$26,299.43
Ag retailer & Elevator	Nitrates	$2466.14
Ag retailer & Elevator	Nitrate	$27,480.98

Ag retailer & Elevator	Nitrate	$1821.87
Ag retailer & Elevator	Nitrate	$18,093.68
Ag retailer & Elevator	Nitrate	$1473.28
Ag retailer & Elevator	Nitrates	$32,511.02
Ag retailer & Elevator	Nitrates	$ 3435.91
Total (74) **Average**		$1,373,492.78 $18,560.71
Nitrate & Pesticides (55) **Average**		$856,707.28 $15,576.50
Carbon Tet (14) **Average**		$391,506.06 $27,964.72
Combination (5) **Average**		$125,279.44 $25,055.89

= 1 Reimbursement
= 2 Reimbursements
= 3 Reimbursements
= 4 Reimbursements
= 5 Reimbursements
= 6 Reimbursements
= 7 Reimbursements
= 8 Reimbursements
= 9 Reimbursements
= 10 Reimbursements

Location of Kansas Agricultural Remediation Reimbursements



12/03

KANSAS

DEPARTMENT OF AGRICULTURE
ADRIAN J. POLANSKY, SECRETARY

KATHLEEN SEBELIUS, GOVERNOR

Presentation to the House Environment Committee

February 3, 2004

State Acquisition of Circle K Ranch in the Middle Arkansas River Basin

David L. Pope, Chief Engineer

Kansas Department of Agriculture's Division of Water Resources

Good afternoon, Chairperson Freeborn and members of the committee, I am David Pope, chief engineer of the Kansas Department of Agriculture's Division of Water Resources. I am here at your invitation to provide information regarding the water aspects of the proposed state acquisition of the Circle K Ranch in Edwards County. I will answer a series of questions your staff provided me earlier, which generally follow the following topics.

Where is the Ranch Located?

The Circle K Ranch is located just southwest of Kinsley immediately adjacent to the Arkansas River in an area we often refer to as the "Middle Arkansas River" subbasin. As we have defined it, the middle Arkansas River subbasin is that portion of the river basin from the Ford-Edwards county line to the confluence of the Arkansas River and Rattlesnake Creek, just east of Great Bend, all within Big Bend Groundwater Management District No. 5 in south-central Kansas. The area just upstream is considered the Upper Arkansas River subbasin. Its boundaries run from the Colorado-Kansas state line to the Ford-Edwards County line, most of which is in the Southwest Kansas Groundwater Management District No. 3.

Is the area in an intensive groundwater use control area?

The immediate area is not part of an intensive groundwater use control area. However, because of concern about the impact groundwater pumping has on streamflow, an intensive groundwater use control area was established in 1986 along the Arkansas River valley throughout the upper Arkansas River subbasin. With minor exceptions, this area has been closed to new water appropriation since then, although some other restrictions date back to the mid to late 1970s. Likewise, the area in the middle Arkansas River subbasin in Big Bend GMD No. 5 has been closed since about 1990, and some

Division of Water Resources David L. Pope, Chief Engineer
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House Environment
2-3-04
Attachment 2

form of earlier restrictions started limiting groundwater development as early the 1980s in part of the area.

The attached map shows many of the key features for this area.

How much water is under the property?

The supply for this irrigated ranch is groundwater from the High Plains Aquifer, which is hydraulically connected to the Arkansas River. This portion of the aquifer also is referred to as the Great Bend Prairie Aquifer. At this location, the shallow river alluvium is intermingled with the regional aquifer, which generally is thicker and deeper from the land surface further away from the river. Near the river, the water level historically has been fairly shallow, at or above streambed elevation of the river, with a gradient toward the river, thus providing some "base flow" or "gain" to the river. However, the saturated thickness of the aquifer is not very great, at least compared to significant portions of the Ogallala Aquifer to the west, which is several hundred feet thick in some locations. Much of the Circle K Ranch area is in the 50- to 70-foot range, except toward the south edge where it may approach 100 feet. Significant groundwater pumping, mostly for irrigation in the ranch area and further upstream, has lowered the groundwater table and contributed to significant reductions in the river's base flow.

What are the Circle K Ranch water rights?

The Circle K Ranch has 57 wells authorized to pump 8,039 acre-feet of water on 5,366 acres by 30 water rights. Forty-seven of the wells are located within 1.25 miles of the Arkansas River. The average reported water use on the ranch from 1989 to 2000 is 6,643 acre-feet.

If acquired, how would water use change?

The proposal is to retire, or dismiss, most of the existing water rights over a period of approximately eight to 10 years as land use is converted to mostly native grasses, which would not require irrigation. The proposal does not include a change in purpose of use. The specific amount that may be retained in irrigated production has not been determined, and it is being considered as part of the overall project implementation, with interagency involvement, an advisory committee and public input. Retaining an amount of roughly 1,000 acre-feet to irrigate four or five irrigation circles generally located the greatest distance from the river is one possibility. From a hydrological standpoint, the larger the reduction, the greater the benefit to the stream-aquifer system.

What is the impact of the proposal on the river?

This question needs to be answered in the context of the regional hydrological system, including the aquifer. The Subbasin Water Resource Management Program has collected a considerable amount of data and studied the stream-aquifer system in this area in the last several years. This state water plan-funded program is designed to work with

local water users and other interests in the area to develop strategies to address groundwater declines and streamflow depletion affecting this area of the Arkansas River Basin. While established earlier and for broader purposes, the program has provided valuable information to help evaluate the Circle K proposal.

Since water right development, there has been a decline in groundwater levels and a reduction in Arkansas River base flow. Rates of irrigation development reached a maximum around 1975, which coincides with the loss in base flow in the both the upper and middle Arkansas River subbasins. Analysis of streamflow records for the period from 1945 to 2001 indicate the river reach between Kinsley and Great Bend produced more base flow than between Dodge City and Kinsley. However, base flow has continued to decline in the middle Arkansas.

Results of previous investigations indicate that groundwater once moved from the aquifer to the stream. A narrow band present along the river prevented the poorer quality river water from entering the groundwater system. Since development of irrigation throughout the area, a reversal of flow gradient now exists due to water level declines. Water from the river flows into the aquifer as recharge, which increases the amount of water available to pump but decreases groundwater quality.

Base Flow

Since 1975, the number of no flow days at the Dodge City USGS gaging station has outnumbered the days with streamflow. When no flow is present at the Dodge City gaging station, base flow typically begins near Wilroads Garden, east of Dodge City, and disappears at the Ford-Edwards County line. In the middle Arkansas subbasin, base flow becomes more consistent west of Great Bend.

In order for base flow to be restored, groundwater levels need to be stabilized at streambed elevation. In addition, it is essential to protect existing water rights. A significant reduction in groundwater use will lead to regional stabilization of the aquifer and an increase in base flow.

Groundwater

The change in groundwater levels is variable across the subbasin with declines more prominent in the western portion and more stable water levels in the eastern portion. Groundwater levels in the area of Circle K Ranch show a decline of two to four feet below streambed elevation. A reduction in groundwater pumping in the area would help stabilize groundwater levels and restore base flow. The Circle K Ranch is favorably located to improve these conditions because most pumping is so close to the river and is in a concentrated amount near the location where base flow to the river is often lost. Edwards County also has the most pumping and significant groundwater decline in the local area, so use reduction will help with long-term stability of the available water supply.

A draft water budget analysis conducted in the middle Arkansas project area indicates outflows exceed inflow by approximately 41,000 acre-feet. The average water use in the subbasin from 1988 to 2000 is 155,000 acre-feet, or approximately 60 percent of authorized quantity. Retiring 6,600 acre-feet of water on the Circle K Ranch would account for 16 percent of this deficit. However, this issue needs to be considered as part of the bigger stream-aquifer system.

On January 12, 2004, I accepted the proposed Middle Arkansas River Subbasin Management Strategies. A primary goal of the subbasin strategy is to achieve maximum water conservation with a reduction in use of 10,540 acre-feet by January 2007. Also defined in the management strategies are priority areas to target cost-share funding. Priority area number one is located in Edwards County. This area is experiencing high groundwater use, declining groundwater levels and little to no base flow. Circle K Ranch is located in this high-priority area. The middle Arkansas management strategies should account for 34 percent of the deficit.

Is there a groundwater model for this area and, if so, does it show the effect on the river?

Groundwater models have been developed in the general area of the ranch, but none have actually encompassed the area directly. In researching the area, it was determined that updating existing models to incorporate the Circle K Ranch was not feasible in the time frame needed for the project acquisition.

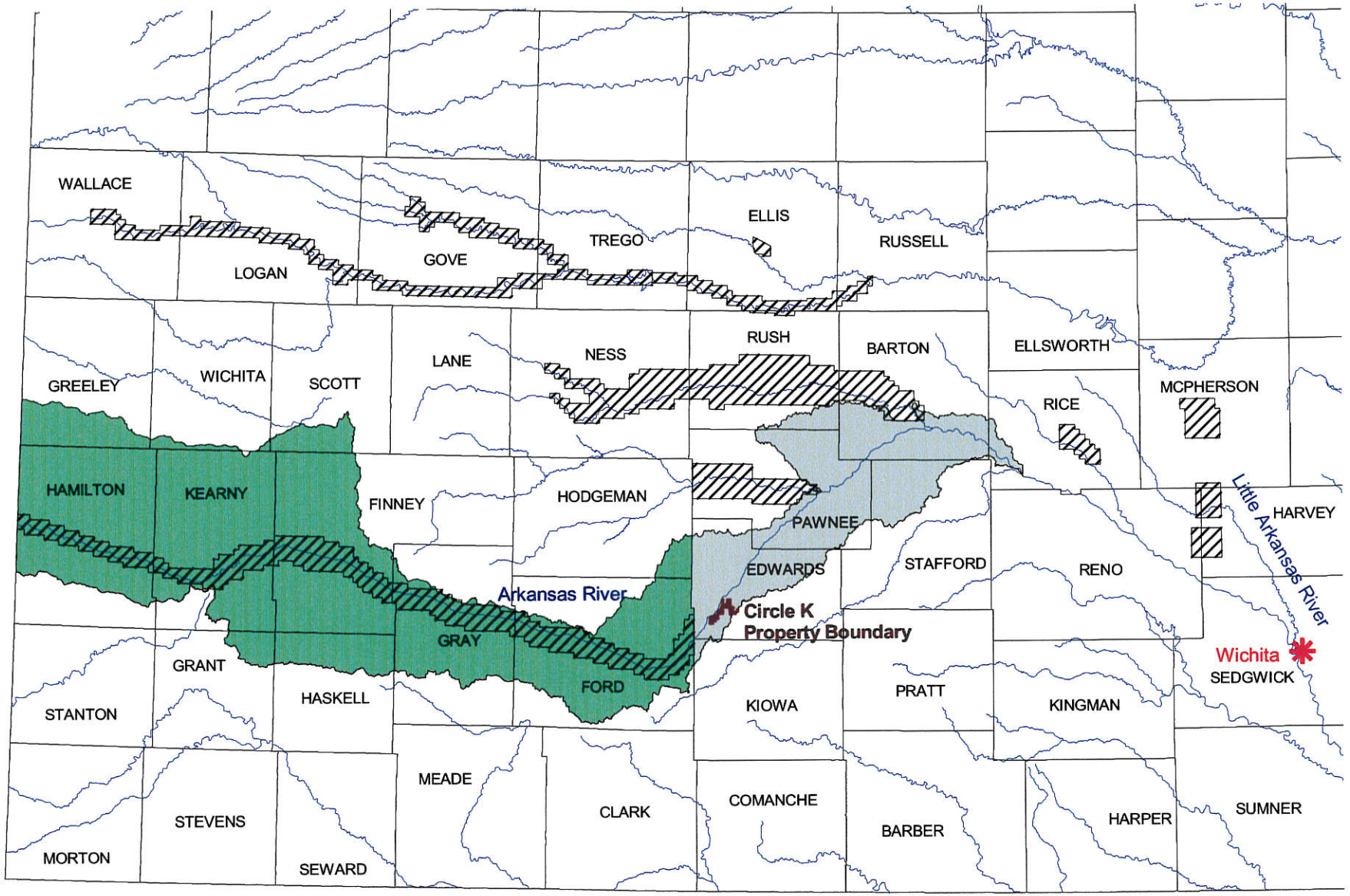
Would this project help the water level at Wichita or provide additional water for the recharge project?

No, it would not. The cities two major sources of water are Cheney Reservoir, which cannot be affected and groundwater pumping from the Equus Beds. The Equus Beds Aquifer is locally associated with the Little Arkansas River system. The Little Arkansas is a tributary to the Arkansas River, with a confluence in Wichita. Any increase in flows of the Arkansas River, even if it would reach that far downstream as a result of retiring ranch water rights, would not provide any additional flow to either the Little Arkansas River or the Equus Beds, because it would pass down gradient of the Equus Beds and the Little Arkansas River system. For the same reason, the Wichita recharge project would not be able to benefit from the Circle K project, as the source for it is the Little Arkansas River.

Conclusion

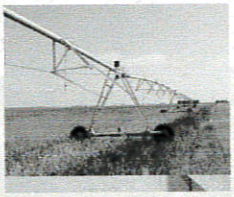
Restoring base flow will be long term, require normal climatic conditions to raise water levels and require a regional reduction in groundwater pumping. The retirement of the Circle K Ranch water rights would provide a significant reduction in groundwater use in an area historically experiencing groundwater declines and contributing to depletion of the river's base flow.

Middle Arkansas and Upper Arkansas River Basins



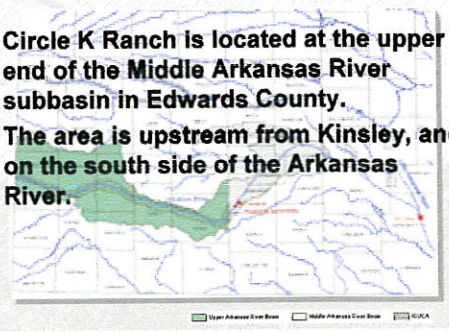
Circle K Ranch

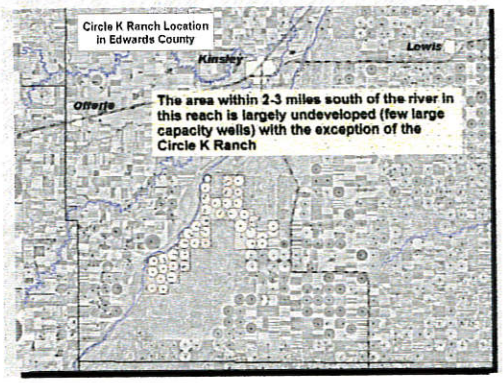
Presentation to the House Environment Committee



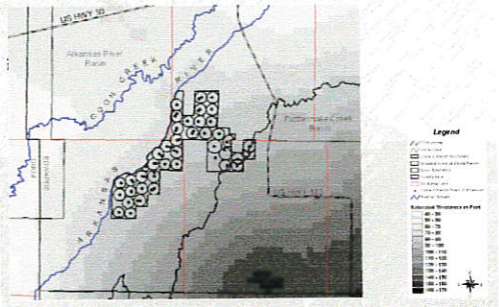
Middle Arkansas Subbasin

- Circle K Ranch is located at the upper end of the Middle Arkansas River subbasin in Edwards County.
- The area is upstream from Kinsley, and on the south side of the Arkansas River.

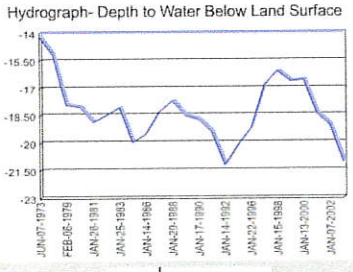




Circle K Ranch
Saturated Thickness 2003



Circle K Ranch

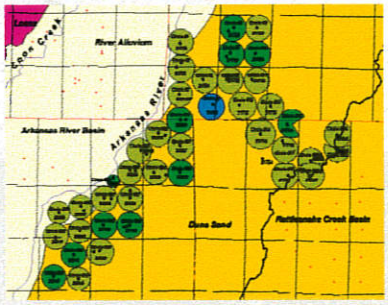


Circle K Ranch

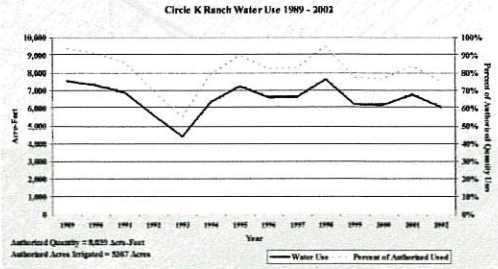
- 57 wells under 30 water rights
- 8039 Acre-feet appropriated for 5366 acres
- 47 wells are within 1.25 miles of the river
- 41 Irrigated Circles
- Reported water use for all of Circle K Ranch

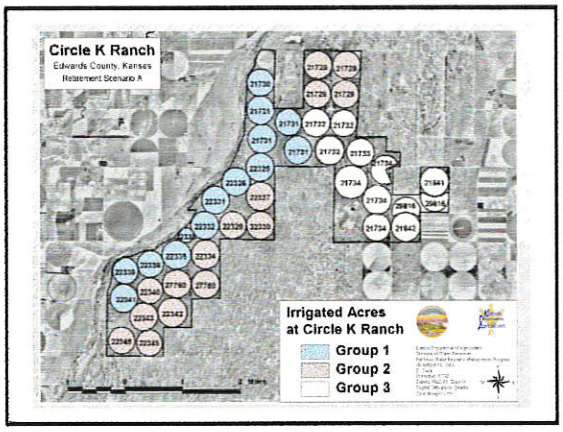
  Average Use- 1989-2000
  AF/YR= 6643
  AF 4485 (1993) Minimum
  AF 7777 (1998) Maximum

Circle K Ranch



Circle K Ranch





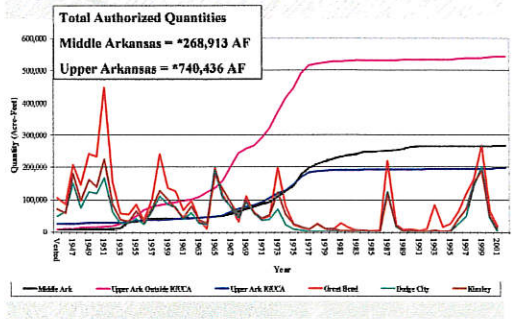
Circle K – Arkansas River

- Since water right development, there has been a:
  - Decline in groundwater levels
  - Reduction in baseflow
- From Eastern Ford County to Great Bend there is a need to:
  - Stabilize groundwater levels
  - Restore baseflow where possible

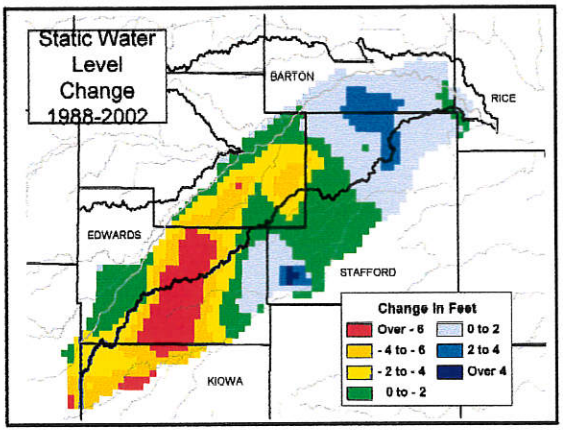
Middle Arkansas Baseflow

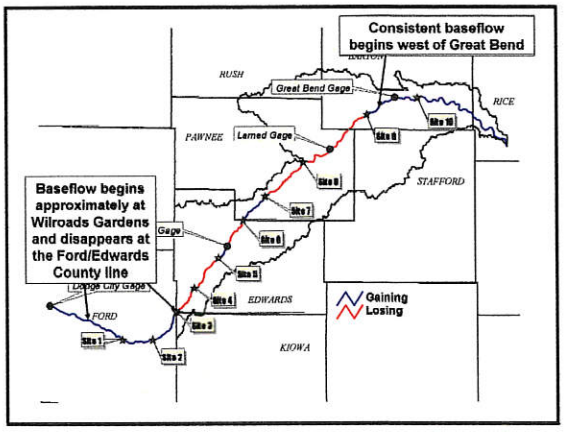
- Rate of development reached a maximum around 1975, which coincides with the loss in baseflow in both the upper and middle Arkansas River subbasins
- Baseflow for period 1945-2001 produced more baseflow between Kinsley and Great Bend than between Dodge City and Kinsley, however baseflow has been declining for this area

Cumulative Authorized Quantity and Baseflow Middle Arkansas, Upper Arkansas, IGUCA Area



*Authorized Quantity from WIMAS database – 9/13/02





Circle K Ranch

Studies and data collection indicate the following:

- Water once moved from dune sand into the river
- Poorer quality of water was confined to a narrow band along the river
- Since development of irrigation throughout the area, a reversal now exists.
- Any flow in river will continue to recharge the aquifer unless conditions in the area change.
- Water from the river does increase amount of water available for pumpage but decrease water quality by adding sulfates, hardness and total dissolved solids to groundwater.

Middle Arkansas Subbasin

- Water Budget analysis indicates outflows exceed inflows by approximately 41,000 AF
- Average water use in the subbasin for 1988-2000 is 155,000 AF with water use ranging from a maximum of 200,000AF (1991) to a minimum of 90,000 AF (1993)

Middle Arkansas Subbasin

- Groundwater levels should be stabilized to protect existing water rights
- Groundwater Levels need to be at streambed elevation in order to provide baseflow
- Reduction in groundwater use will lead to regional stabilization of aquifer and baseflow

2-8