MINUTES

JOINT COMMITTEE ON ENERGY AND ENVIRONMENTAL POLICY

October 7-8, 2010
Room 152-S—Statehouse

Members Present

Senator Carolyn McGinn, Chairperson
Representative Carl Holmes, Vice-chairperson
Senator Pat Apple (October 7 only)
Senator Janis Lee
Senator Roger Rietz
Representative Mitch Holmes
Representative Forrest Knox
Representative Cindy Neighbor
Representative Tom Sloan
Representative Vince Wetta

Staff Present

Heather O'Hara, Kansas Legislative Research Department
Cindy Lash, Kansas Legislative Research Department
Matt Sterling, Office of the Revisor of Statutes
Renae Hansen, Committee Assistant

Others Attending

See attached list.

Thursday, October 7
Morning Session

The meeting was called to order by Chairperson McGinn at 10:00 a.m. Chairperson McGinn began the meeting with a welcome and explanation of the agenda.

Overview of Public Water Supply in Kansas

Tracy Streeter, Director, Kansas Water Office, (Attachment 1) gave a presentation to the Committee on the state of affairs concerning water supply issues. He noted that Kansas' water use is divided as follows: 66 percent irrigation, 16 percent water power, eight percent municipal, seven percent industrial non-consumption (hydroelectric), two percent industrial consumption, and one percent other. He also highlighted that five of the 822 water providers serve 42 percent of the total population (Johnson County; Wichita; Topeka; Kansas City, Kansas; and Olathe). The Kansas, Missouri, and Spring rivers are the only entities open to new appropriation of water usage. Fifty-nine percent of the water usage is obtained from surface water and 41 percent is obtained from groundwater. Mr. Streeter further stated that some water entities use public wholesale water supply districts to meet their needs because of reduced population and increased costs of providing water. He also discussed the Kansas water assurance districts in the northeast part of the state. Mr. Streeter indicated Kansas' storage conservation capacity of water is about 1.5 million acre-feet of water. Additionally, he talked about the future use storage capacity of other Kansas lakes. Mr. Streeter also outlined the challenges to Kansas' water supply. He noted that Southeast Kansas uses a large amount of water from the Ozark Aquifer in Missouri. Other challenges include the Missouri River's degradation and reservoir storage reallocation. Additionally, there are other challenges due to competing needs of water for drinking, energy, industrial, economic development, recreation, and fish and wildlife.

In response to questions, Mr. Streeter noted that the Kansas Water Office is working to find solutions to Kansas' water issues. He stated that to have enough water for a second nuclear power plant, the state would need to dredge the John Redmond Reservoir, build a new reservoir, or transfer water from the Kansas River. Mr. Earl Lewis, Kansas Water Office, answered questions of the Committee members. It was noted that Kansas will continue to have some water quality issues.

Groundwater Supply Status and Availability

Rex Buchanan, Interim Director, Kansas Geological Survey, (Attachment 2) spoke to the Committee about the range of services that the Kansas Geological Survey provides. Brownie Wilson, Manager of Geohydrology Support Services, Kansas Geological Survey, (Attachment 3) spoke to the Committee about Kansas' groundwater supply, specifically the High Plains Aquifer. He included information on the annual precipitation numbers across Kansas. He showed graphics of Kansas by county and each county's groundwater versus surface water usage. Mr. Wilson presented information that described how Kansas Geological Survey staff keep track of the water levels from year to year in the Ogallala Aquifer and other Kansas aquifer systems. He noted that precipitation affects aquifers by altering the aquifers' pumping patterns.

Options for Increasing Groundwater Availability

Wichita Aquifer Storage and Recovery Project (ASR Project)

Deb Ary, Superintendent of Production and Pumping, Wichita Water Utilities, (Attachment 4) spoke to the Committee on the challenge of meeting Sedgwick County's water supply needs while still protecting local water supplies. She outlined the future projections of water use compared with the current sources of water supply. She explained to the Committee how Wichita Water Utilities will be recharging the Equus Beds Aquifer with excess water from the Little Arkansas River. She also explained the integrated local water plan. She noted this water conservation plan will impact less than 400 acre-feet of water. Ms. Ary included in her testimony a graph showing water use from 1940–2005 (Attachment 5).

In response to questions, Ms. Ary noted that the Little Arkansas River has less salt in it than other rivers in the area.

Brian Meier, Associate Environmental Engineer, Burns and McDonnell, (see Attachment 4) provided the Committee with information about the challenges of the aquifer storage and recovery program and how Burns and McDonnell plan to meet those challenges. He talked about the different phases of implementing the recovery program and the details for each phase. He gave a description of the treatment process of the water before it is injected back into the aquifer. Mr. Meier described the regulatory controls to which the recovery project must adhere. Atrazine is one of the key components that must be taken out of the water before it is injected back into the aquifer. He noted that there must be a continuous monitoring of pH, temperature, turbidity, and specific conductance. Mr. Meier stated that nearly one billion gallons of water have been recharged with just the implementation of phase one of the ASR Project. Mr. Meier indicated that the cost of all phases will be around $350 million. Burns and McDonnell requested that the project be supported with state dollars through 2015, but the majority of the project is funded by the customers.

In response to questions, Mr. Meier and Ms. Ary noted that it costs approximately $1.50 per 1,000 gallons of water to prepare the water for entry back into the aquifer. Ms. Ary stated that the ASR Project uses a large amount of electricity and the advanced oxidation process consumes a large amount of energy. Wichita Water Utilities is preparing to change its chemical removal process as changes in chemical content regulations for water occur.

Surface Water, Reservoir Status, and Availability

Earl Lewis, Assistant Director, Kansas Water Office, (Attachment 6) spoke to the Committee about Kansas' surface water. He noted that when a state relies on surface water for its water supply, the state must have a form of water storage to make it through times of drought. This is the reason behind the construction of Kansas' reservoir system. Two-thirds of Kansas' water system is backed up by reservoirs. Mr. Lewis commented that the storage systems' main problem is sedimentation in the lakes and as a result, the loss of water storage which is occurring at a faster pace than anticipated. Kansas Water Office staff ask questions when deciding to build a reservoir, such as how long it will take to build the reservoir; how much the reservoir will cost; what the benefits of the reservoir will be; and how long these benefits will last. When the potential benefits of the reservoir outweigh the cost to build the reservoir, the Kansas Water Office builds the dam for the reservoir. An eminent problem for water supply versus demand currently exists in the Neosho River Basin system.

Mr. Lewis also noted that the average depth of the water in the John Redmond Reservoir is five feet. In many places there is more sediment below the water, than water above the sediment. Most of the sediment comes from the streambanks on the rivers that flow toward the reservoir. Additionally, the Kansas Water Office is looking at other potential reservoir sites to create more of a supply for the Neosho River. Mr. Lewis stated that it has been estimated that it would cost $6.60 per cubic yard to dredge a lake and the John Redmond Reservoir is estimated to cost around $500 million dollars total to dredge.

In response to questions, Mr. Lewis noted that the longer the state waits to make improvements to the reservoir storage system, the higher the cost to correct the problems that currently exists. He stated that the Kansas Water Office would determine the cost differential of making the repairs now or waiting until 2030 when the payments to the U.S. Army Corps of Engineers are due. Those figures will be considered using the time value of money. Mr. Lewis indicated that the Kansas Water Office is mainly changing the slope of the riverbanks to keep the water from eroding the soil.

U.S. Army Corps of Engineers' Role and Responsibility

John Grothaus, Chief of the Formulation Section in Planning, Kansas City District, US Army Corps of Engineers, (Attachment 7) spoke to the Committee on the role of the Corps of Engineers in water resources support. Its responsibilities are: flood risk management, navigation, fish and wildlife habitat restoration, water supply, recreation support, and hydropower supply. Mr. Grothaus spoke about the programs for which the Corps of Engineers is able to appropriate money. The Corps of Engineers has spent federal money on surveys that are able to determine how much capacity is currently available compared to how much was anticipated to be available. He gave details of line item funded studies and projects in the Kansas City and Tulsa federal water districts. He commented that all of the studies are cost-shared between the Corps of Engineers and the state involved. Additionally, the Corps of Engineers has spent money on the Missouri River degradation study. It is a $6.8 million study over five-to-six years and has a 50-50 cost-share. Finally, he spoke about a study of the Missouri River basin authorized by the Omnibus Appropriations Act of 2009, Title I, Section 108 related to the Pick-Sloan Flood Control Act of 1944.

In response to questions, Mr. Grothaus noted that there are many other states that have water supply contracts with the Corps of Engineers. The terms of the contract for each lake varies according to the original contract that was written with each state.

Reservoir Assessment Program

Dr. Ed Martinko, Director, Kansas Biological Survey, (Attachment 8) offered testimony regarding the assessment of Kansas reservoirs and the issues, implications, and initiatives involved with those assessments. Dr. Martinko noted that 2010 was a bad year for algae outbreaks in Kansas lakes. He commented that siltation creates shallow areas which allow the sun to penetrate deeper into the water, creating the algal blooms. He stated that the state needs to begin to think of the upkeep of reservoirs in the same way the state thinks of keeping up our roads and highways. He identified four critical issues for the State of Kansas regarding reservoirs:

- What is the current status of our lakes and reservoirs;
- What causes our lakes and reservoirs to become impaired;
- Where and when are critical problems likely to occur in our lakes and reservoirs; and
- Can we proactively manage and plan for reservoir sustainability.

Dr. Martinko commented that it is important that the state conduct modeling studies to predict critical problems of reservoirs in order to be proactive in caring for the reservoirs and be ready for emergency situations. He noted that we need to bring all of the information together to have a comprehensive look at the current and potential future scenarios concerning the reservoirs. Dr. Martinko believes there needs to be an online repository of information for all of the Kansas reservoirs. This would allow the state to have a management tool and decision-management mechanism as a reference. He noted we need to be able to increase our data in order to make better decisions in managing Kansas reservoirs.

In response to questions, Dr. Martinko noted that it would take about $600,000 per year in order to implement all of the Kansas Biological Survey's Reservoir Assessment Program in its entirety.

Options for Increasing Surface Water Availability

Dredging

Dan McDougal, President and Chief Executive Officer, Dredge America, (Attachment 9) spoke to the Committee about dredging and its effect on the environment and the economy. He also reviewed the various methods of dredging. Dredging can increase water depth, improve water quality, improve wildlife habitats, increase water storage capacity, increase sediment settling capacity, decrease flooding, and create wetlands. He commented that the most cost effective disposal of the sediment is to put it in a confined disposal facility. Other options are to create islands, create wetlands, move the sediment into geotubes, and mechanically dewater the sediment and move it offsite. He noted that it is probably cheaper to make a new lake, but it costs in real estate, takes farm ground out of operation, impacts the local communities, and affects water rights.

In response to questions, Mr. McDougal noted that economies of scale might allow Dredge America to bring the cost down per cubic yard of sediment. He commented that in Horton, Kansas, at the Mission Lake dredging project, the company had to make a bowl in the ground away from the lake that sediment was then transported to. The water then drained from the sediment and returned back to Mission Lake.

Reservoir Construction

Weir Labatt, Board Member, Texas Water Development Board, and Chairman, Western States Water Council (via conference call) (Attachment 10) spoke to the Committee on Texas water issues and, in particular, reservoir water issues. He noted that Texas is currently faced with needing more water than it has due to an 18 percent decrease in available water, but with twice as many people to serve, with the result of a need for an additional 8.9 million acre-feet of water. He spoke about the financial assistance programs designed to help with the improvement of the Texas Water Plan. He noted it will take about $31 billion to implement the proposed plan. Approximately $17 billion of that will come from the state of Texas. He also spoke about some of the failures, challenges, and successes of improving the Texas water system. Mr. Labatt believes that reservoirs are necessary to put into place the Texas Water Plan and to meet the water needs of Texas citizens.

In response to questions, Mr. Labatt expects to invest approximately five to 15 years of planning a reservoir before construction would commence. Mr. Labatt also noted that there are not any current plans for dredging Texas lakes, because the cost of dredging is prohibitive to Texas making that choice over building new reservoirs. He further stated that presently there are various issues with environmental groups and individual landowners with regard to building new reservoirs. Mr. Kevin Ward and Ms. Carolyn Briton assisted in answering questions.

Impact of Water on Energy Generation

Paul Ling, Manager of Environmental Services, Kansas City Power and Light, (Attachment 11) spoke to the Committee about the company's current and future water challenges. One of its biggest issues is the cooling lake at La Cygne, in conjunction with the company's coal-fired power plant. If the rules for cooling change as expected the company will have to consume more water in order to meet those standards. Additionally, the new revision to the Clean Water Act section 316(b) will have an impact on the La Cygne lake.

In response to questions, Mr. Ling suggested that the federal government look at the new regulations on a site-by-site basis and do a cost-benefit analysis. As the proposed law stands, the

Environmental Protection Agency (EPA) will be implementing the new regulations on a nation-wide basis.

Wayne Penrod, Executive Manager of Environmental Policy, Sunflower Electric Power Corporation, (Attachment 12) presented information to the Committee on some of the power plant design choices and the relationship to water issues. He talked about how Sunflower Electric Power Corporation uses water and what some of the other choices and trade-offs are compared to other cooling systems. He discussed the Clean Water Act section 316(b) and the potential impact of the EPA's effluent regulations. He commented on the adequacy of the water supply regarding Sunflower Electric Power Corporation's current and future energy plants.

Bill Eastman, Director of Environmental Services, Westar Energy, (Attachment 13) spoke to the Committee on Westar Energy's water usage for its various energy-producing units. He also discussed the impacts of the Clean Water Act section 316(b) on Westar Energy. Additionally, he talked about the water concerns Westar Energy has regarding its energy production.

Joe Dick, Government Affairs Officer, Kansas City Board of Public Utilities, (Attachment 14) offered information to the Committee on Kansas City Board of Public Utilities's water usage for energy production and effects that the EPA regulations may have on their operation.

Representative Holmes asked the members of the various energy producers to come together with ideas on how Kansas can help them deal with the new EPA rulings and report back to the Committee at the November meeting.

The Committee adjourned for the day at 4:45 p.m.

Friday, October 8

The meeting was called to order at 9:00 a.m.

Public Water Supply Solutions

Reservoir Roadmap - Neosho Basin Approach;
Public Water Supply Issues in Rural Communities

Dennis Schwartz, Public Water Supply Chair, Kansas Water Authority, and Vice President, Kansas Rural Water Association, (Attachment 15) spoke to the Committee on the Neosho Basin approach to road mapping the Kansas reservoirs. He noted that there are three sections or volumes to the road map: quantification of the issue statewide; statutory and budget considerations; and a basin approach to reservoir sustainability. He emphasized that Kansas needs to take a more active role in protecting and developing water supply reservoirs to avoid a crisis. One issue that needs to be addressed is the Kansas Water Authority of the Corps of Engineers's request to raise the permanent pool of the John Redmond Reservoir by two feet. Mr. Schwartz also offered testimony representing the Kansas Rural Water Association (Attachment 16). Mr. Schwartz supports the federal Safe Drinking Water Act and noted that our country enjoys some of the safest and high quality drinking water available anywhere in the world because of the Safe Drinking Water Act. He encouraged the Committee to promote water conservation and to work diligently to keep the spread of zebra mussels from being prolific. Mr. Schwartz stated that public water supply touches every life it serves every day and plays a tremendous role in the health of the citizens.

In response to questions, Mr. Schwartz noted that there is very little revenue being allocated to the upkeep and renovation of water. Mr. Schwartz noted the difference between the cost of tap water and a liter of bottled water is very large. For the price of a bottle of water one can get several hundred gallons of water out of the tap. Tracy Streeter, Kansas Water Office, assisting in answering questions. Mr. Streeter believes the public must receive education about the importance of water issues in order for them to accept a higher rate that would allow the water entities to do some of the necessary upgrades.

Public Water Supply Issues in Johnson County

Mike Armstrong, General Manager, WaterOne, Water District Number One of Johnson County, (Attachment 17) spoke to the Committee on the every day workings of its water supply service. He noted that WaterOne gets two-thirds of its water from the Missouri River and the other one-third from other sources. WaterOne has two water treatment plants: Hansen Treatment Facility and Wolcott Treatment Facility. When WaterOne decided it needed to add more water to its system, it chose to use the Missouri River. He stated that in the Missouri River Valley there are six reservoirs in the system and four to five of those reservoirs are the largest water storage systems in the nation. Approximately 25 percent of the Kansas population relies on the Missouri River system for its water source. Mr. Armstrong explained the degradation of the Missouri River and its effects on their water system. The degradation of the Missouri River also affects the Kansas River. WaterOne determined that it needed to build a river weir in order to maintain reliability of its Kansas River intake process and to keep it consistently operational. In 2009, WaterOne spent $15 million to build this weir. Mr. Armstrong noted that WaterOne is requesting a minimum amount of funds to help with a study to determine the best solution to the degradation of the Missouri River. He also outlined the Missouri River Authorized Purpose Study and commented that he believes that this study is unnecessary as the Corps of Engineers has performed many studies on the Missouri River. He requested that the Kansas Legislature allocate funding to the feasibility study on the Missouri riverbed degradation, consider the Missouri River Authorized Purpose Study in light of all stakeholder interests on the Missouri River, and that the Kansas Water Authority expand membership to include a water assurance district representative and a Missouri River representative.

In response to questions, Mr. Armstrong commented that when the Missouri River is dredged there is a fee paid to the state for the amount of sand that is dredged. A discussion ensued about the difference between taking water from the Missouri River versus the Kansas River. Mr. Armstrong noted that the release of Missouri River water for water navigation is beneficial to many other entities that regulate areas such as public water, energy cooling, and hydroelectricity.

Water Conservation in the City of Hays

Henry Schwaller IV, City Commissioner, City of Hays, (Attachment 18) spoke to the Committee on the Hays water shortage of 1991 and the short- and long-term initiatives the city developed to deal with the problem. He outlined a series of initiatives that the city has implemented to reduce the use of water. He noted that the city's water usage rate is down 45 percent from the peak demand and is the same consumption level as in 1972. The changes have now become a way of life for Hays citizens. The city's focused strategy included community education, proactive systems of incentives and regulations, and a shared attitude of making existing resources last as long as possible.

Irrigation Systems and Water in Kansas Agriculture

Dr. Dan Rogers, Professor, Biological and Agricultural Engineering, Kansas State University, (Attachment 19) spoke to the Committee on Kansas' irrigation systems and water. He noted that

approximately 85 percent of Kansas' water is used for irrigation in the state. He also gave examples of how much water is used to make various meals that one might eat. He discussed the historical development of irrigation in Kansas. Dr. Rogers noted that the individual's job is to optimize the use of available resources within physical, social, and economic constraints. He commented that one must place value on conservation and being environmentally friendly, but often the short-term economic realities override the long-term goals.

In response to questions, Dr. Rogers noted that alfalfa has a high water usage, but also has a high crop price on the market. He noted that concerning the economics of crop raising that corn is currently the most economical crop to raise with high yields and high grain price.

Update on Statutory Exception for Abandonment (2010 House Sub. for SB 316)

Lane Letourneau, Water Appropriation Program Manager, Division of Water Resources, Kansas Department of Agriculture, (Attachment 20) spoke to the Committee on House Substitute for Senate Bill 316. The bill allows an exception to abandonment if the water right is groundwater; the water right is located in an area closed to new appropriation either by rule, regulation, or order; and the means to divert the water for beneficial use are available within a reasonable time.

In response to questions, Mr. Letourneau noted that he will provide Representative Carl Holmes with information prior to the Joint Committee on Administrative Rules and Regulations meeting for his review.

Discussion on Creating a Conservation Use Water Right (2010 SB 510)

Burke Griggs, Staff Attorney, Kansas Department of Agriculture, (Attachment 21) recommended to the Committee that conservation be recognized as a beneficial use of water. Mr. Griggs spoke about the history of Kansas water law. Mr. Griggs stated that conservation is not waste or preservation; it is the keeping of water for later use when it will be more valuable. The goal of conservation use is to fuse the protection rights of water with the conservation of that water. Included in Mr. Griggs testimony was a map (Attachment 22) that shows the areas closed by rule or order. He noted that approximately 21 percent of the state is closed to irrigation rights. Conservation use reserves the use of water for future generations.

Paul Tobia, Conservation Subcommittee Chairperson, Kansas Water Congress, (Attachment 23) spoke to the Committee on the highlights from the October 6, 2010, meeting of the subcommittee of the Kansas Water Congress State Affairs Committee on Senate Bill 510.

Wayne Bossert, Manager, Northwest Kansas Groundwater Management District Number Four, (Attachment 24) spoke to the Committee regarding Senate Bill 510, which eliminated the Water Rights Conservation Program at the end of 2009. Mr. Bossert gave some background information by highlighting six fundamental issues that are necessary for a workable replacement conservation program to exist. He noted his district's concerns and offered some recommendations to be considered. His district believes that a well-accepted Water Resource Conservation Program as a conservation tool could be implemented to address the issues of water conservation and water rights preservation in Kansas.

Toby Dougherty, City Manager, City of Hays, (Attachment 25) spoke of the specific benefits to Hays of the potential legislation that might be considered during the 2011 Legislative Session for

the maintaining of water rights even when an entity uses conservation. He noted that Hays continues to pump water from the Dakota Aquifer and the R9 Ranch in order to maintain the water rights in those two entities. Mr. Dougherty stated that the City of Hays believes there should be a program that allows the owner of water rights to set aside those rights for five or 10 years in order to use the rights when the need is greater.

John Donley, Assistant General Counsel, Kansas Livestock Association, (Attachment 26) spoke to the Committee about Senate Bill 510. He commented that there are two sides to the issue: some that want the Water Resource Conservation Program as it was originally written and some that see Senate Bill 510 as the resolution to a problem. He believes that all of the people involved with the issue need to come together with a consensus on the issue.

Leslie Kaufman, Executive Director, Kansas Cooperative Council, (Attachment 27) spoke to the Committee on the water conservation issue. She noted that Senate Bill 510 is a more cost-effective means of addressing water conservation than other plans that have been proposed at various times. The cost estimate was extremely modest compared to certain water right "buy-out" plans of the past.

Steve Swaffar, Natural Resources Director, Kansas Farm Bureau, (Attachment 28) offered testimony regarding the water conservation issue. He noted that the Kansas Farm Bureau is opposed to the concept of non-use. It believes that there are too many unexplained issues that will come to light if the non-use conservation right is exercised. Changing the law would bring up too many unexplained and yet to be answered questions and areas of contention.

Discussion on Groundwater Management Districts' Permits

Lane Letourneau, Water Appropriation Program Manager, Division of Water Resources, Kansas Department of Agriculture, (Attachment 29) spoke to the Committee on the permitting process for water usage. He noted that all water organizations in Kansas use the safe yield process for permitting the districts. He explained how this process works and what the Kansas Department of Agriculture specifically does to determine if there is water available for use that would allow the department to permit water usage for any such area. Mr. Letourneau talked about the subtle differences between the groundwater management districts themselves and the state rules when determining if an area can have a new water withdraw. He presented some specific recent examples of water requests in order to show the Committee some of the different scenarios that the department has to analyze to determine who is allowed water rights and who is not. He noted when the Department decides to issue a permit, it uses area, rate of recharge, and amount already appropriated.

In response to questions, it was discussed that the safe yield is based on what water will be there on a long-term basis.

Overview of Follow-Up Information from the September Committee Meeting

Cindy Lash, Kansas Legislative Research Department, reviewed the follow-up information that was submitted from presenters at the Committee's September 9, 2010, meeting, based on Committee members' requests.

- Environmental Protection Agency (EPA) (Attachment 30);
- Newspaper Articles, EPA, Sarah Hatch (Attachment 31);
- Mid-America Regional Council, Amanda Graor (Attachment 32); and

- Sierra Club, Chris Cardinal (Attachment 33).

Bill Eastman, Director of Environmental Services, Westar Energy, spoke to the Committee about some of the issues the Committee had asked him to address in the previous meeting. He offered information about the new scrubbers that were installed at the Jeffrey Energy Center. He noted that each scrubber costs approximately $150 million from design to installation. He stated that the costs of the Lawrence Energy Center's upgrades were approximately $360–$380 million. He discussed the issue of using the gas peaking plants around Wichita and Hutchinson and that they had become a target by the EPA because the plants are used in the summer. Mr. Eastman reported that summer is the worst time of the year for NO_x in the air, which is what the gas plants produce.

Kansas Department of Health and Environment's Update on Sunflower Plant's Permit

John Mitchell, Director of Environment, and Rick Brunetti, Director of the Bureau of Air and Radiation, Kansas Department of Health and Environment (KDHE) spoke to the Committee about the Sunflower Plant's permitting process and where that process currently stands. They noted that there is an 18 month window from the time the permit application is deemed complete. That starts from the day that KDHE had the first public comment period. Mr. Mitchell and Mr. Brunetti noted that this permit time will take less time because of the previous permit that was submitted. KDHE presented two letters for the Committee's review (Attachments 34 and 35).

Dr. Ingrid Garrison, Environmental Health Officer and State Public Health Veterinarian, KDHE, (Attachment 36) spoke to the Committee about a study that was done by the Centers for Disease Control and Prevention (CDC) concerning cardiovascular and breathing issues. The study looked at several areas and various time frames throughout 2006. The CDC discovered that there was a 40 percent higher incidence of someone going to the emergency room during the burn period compared to the post-burn period. Additionally, during that time there was five times more hospitalization of asthma patients during the burn period than post-burn period.

Representative Knox suggested that the Committee look at a more narrow period of difference between the burn period and the non-burn periods. Additionally, Representative Carl Holmes suggested that any particulate that might cause an asthma attack also be tracked on the days of study to determine if one or more of those items could have triggered the attack. Dr. Garrison mentioned that another study might be available within a year. She noted that the state epidemiologist is interested in this project.

Other information for the Committee's review:

- Chart on consumptive and non-Consumptive use for Kansas power plants (Attachment 37); and
- Kansas Water Office (Attachment 38).

Committee Discussion, Recommendations, and Direction to Staff

Air Quality

The Committee recommends that it write a letter to the EPA, the current congressional delegation, and after the November election, the new congressional delegation. The Committee decided that the unique situation of the Flint Hills burn issue needs to be addressed in the letter.

Water

The Committee spent time discussing the water rights and water conservation issues. A discussion ensued concerning the viability of the Water Rights Conservation Program and its potential use in Kansas.

Agenda for Final Meeting

The Committee discussed the potential agenda for the final meeting for the Interim Session.

- Water Rights Conservation Program - information on its viability for Kansas;
- Sedimentation at John Redmond Reservoir;
- To dredge or not to dredge;
- Potential legislation for water issues;
- Levy issue at John Redmond Reservoir;
- Potential sites for new state reservoirs;
- Bathymetric surveys from past compared to present;
- Statutory mandate of Kansas Corporation Commission report;
- Gulf oil spill update; and
- Draft letter to the EPA.

Chairperson McGinn made closing comments and noted the next meeting is scheduled for November 9, 2010.

The meeting was adjourned at 4:08 p.m.

Prepared by Renae Hansen
Edited by Heather O'Hara

Approved by the Committee on:

November 9, 2010
(Date)

JOINT COMMITTEE ON ENERGY AND ENVIRONMENT POLICY

GUEST LIST

DATE: October 7, 2010

NAME	REPRESENTING
Nelson Krueger	Leading Edge Ltd. + PAR
Leslie Kaufman	Ks Co-op Council
Mark Schreiber	Westar Energy
Ron Seeber	KGFA / KARA
Chris Cardinal	Sierra Club
DEREK HEIN	HEIN LAW FIRM
Maril Hartnett	
Kent Askren	Ks Farm Bureau
Steve Swaffar	Ks Farm Bureau
Rob Mehly	Kearney & Assoc.
Shari Albrecht	KDHE
SEAN MILLER	CAPITOL STRATEGIES
DAVE Holthaus	KEC
TOM DAY	KCC
LARRY BERG	CITY OF HAYS
Ken Peterson	KS Petroleum Coned
John Donley	KS Lusk. Ass'n
[illegible] Casey	GBA

JOINT COMMITTEE ON ENERGY AND ENVIRONMENT POLICY
GUEST LIST

DATE: October 8, 2010

NAME	REPRESENTING
SEAN MILLER	CAPITOL STRATEGIES
Steve Swaffar	Ks Farm Bureau
MIKE TATE	KDHE
Doug Mays	Ks Rural Water Assn
MIKE ARMSTRONG	WATER ONE
Darci Meese	Water One
Dave Waldo	KDHE
Dennis Schwartz	KS Water Authority
Whitney Damron	Empire District Electric Co
LARRY BERG	CITY OF HAYS
Leslie Kaufman	Ks Coop Council
MARK RUDE	GMD 3
Tim Boese	GMD 2
Toby Dougherty	Hays
Paul Briseno	Hays
Nelson Krueger	LE - Quanta
Burke Griggs	DWR
Mark Heim	KDA
Dave Holthaus	KEC
John Donley	KLA
BRAD HARRELSON	KPB

JOINT COMMITTEE ON ENERGY AND ENVIRONMENT POLICY

GUEST LIST

DATE: October 8, 2010

NAME	REPRESENTING
Rob Mealy	Kennedy & Assoc
John Mitchell	KDHE
Ingrid Garrison	KDHE
Shane Lyle	KGS
MATT HICKAM	Kensinger & Hickam

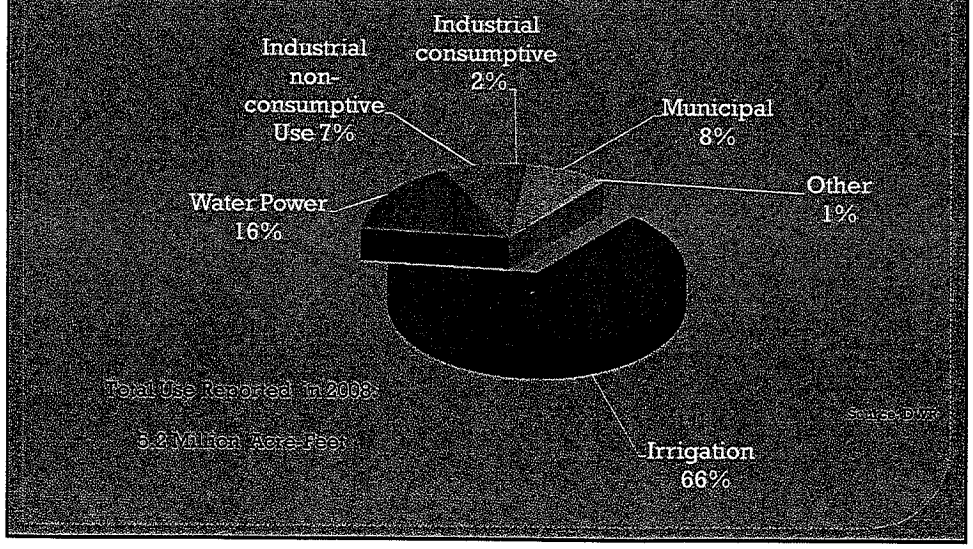
Overview of Public Water Supply in Kansas

Joint Legislative Committee on Energy and Environmental Policy
October 7, 2010

KANSAS WATER OFFICE

Tracy Streeter
Director
Kansas Water Office

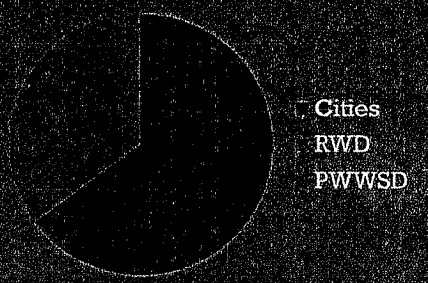
2008 Water Use By Type

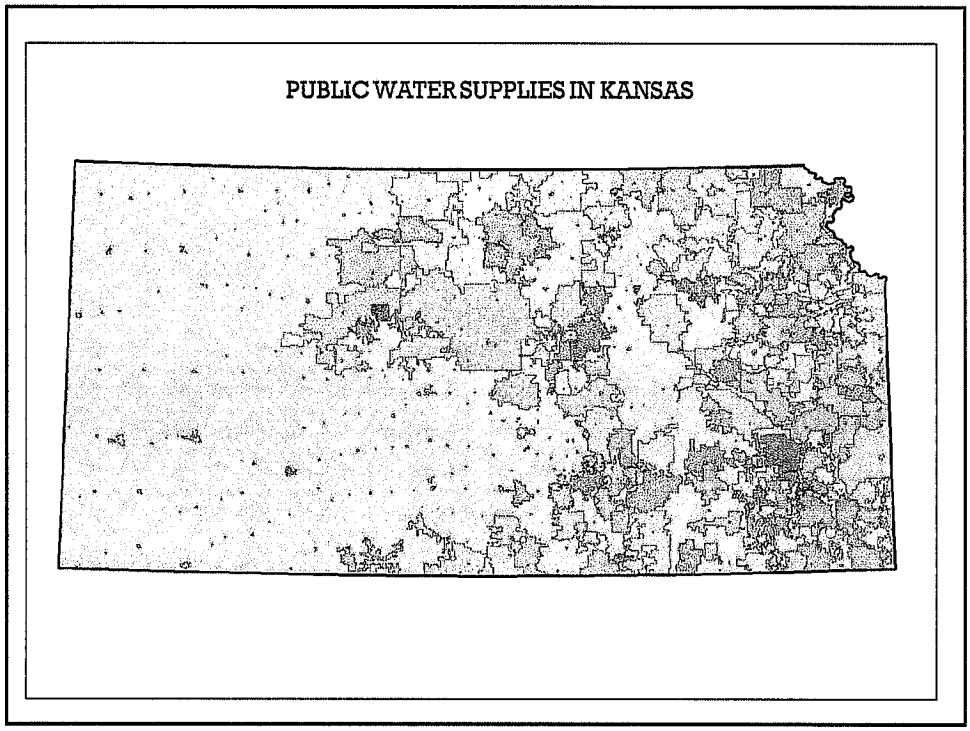


JOINT COMMITTEE ON ENERGY AND ENVIRONMENTAL POLICY
DATE: 10/7/10
ATTACHMENT 1

Water Supplier Demographics

- 822 Total
- 790 serve < 10,000
- Five serve 42% of the total population
  - JO Co. WaterOne
  - Wichita
  - Topeka
  - KCK BPU
  - Olathe

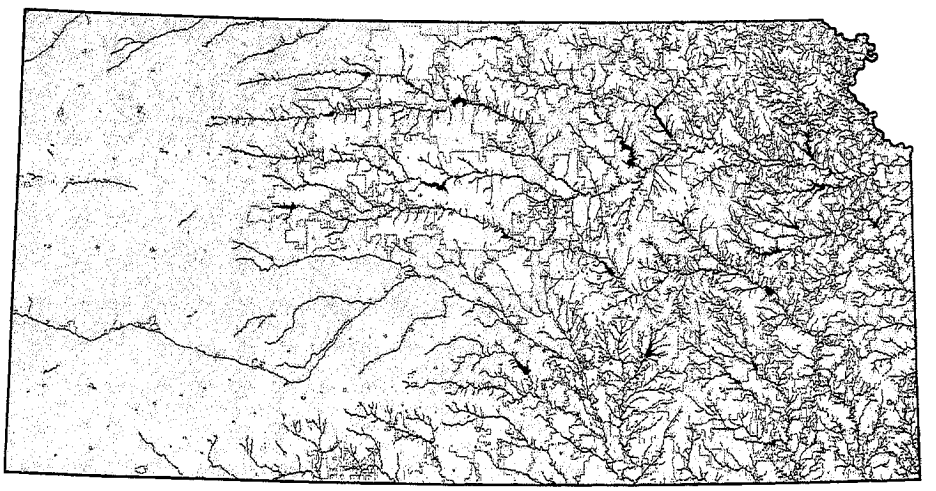




MAJOR AQUIFERS IN KANSAS

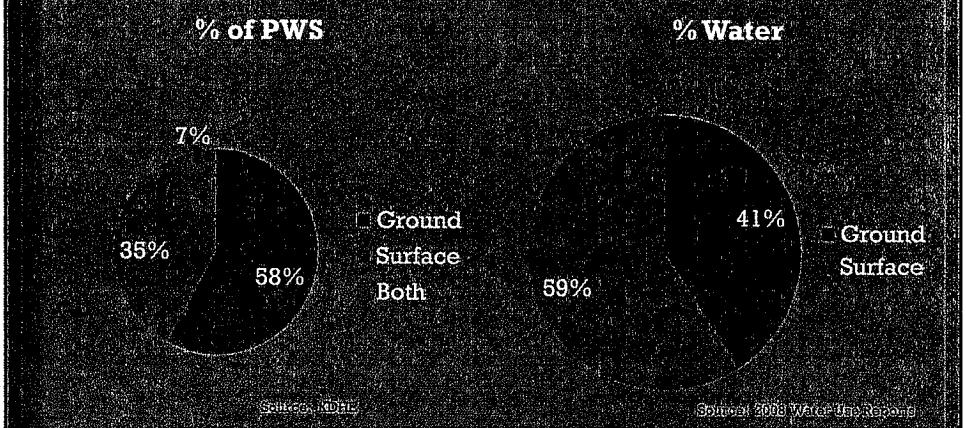
Alluvial · Glacial Drift · High Plains · Ozark
Dakota · Flint Hills · Osage · Public Water Supplier

MAJOR STREAMS, RIVERS & RESERVOIRS



Perennial Streams · Federal Lakes · Public Water Suppliers

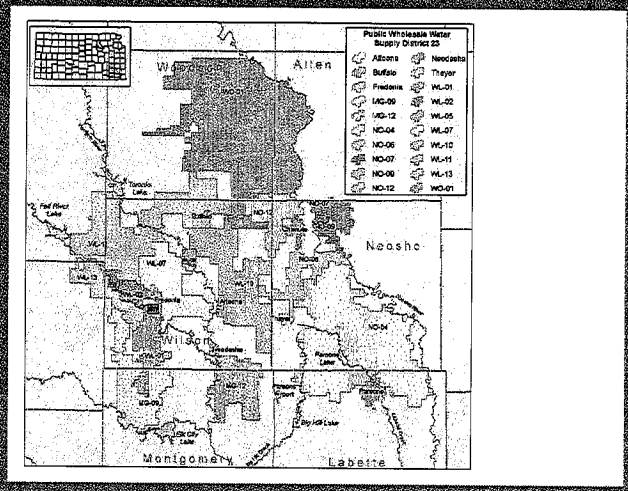
PWS Use: Groundwater vs Surface Water



Public Wholesale Water Supply Districts

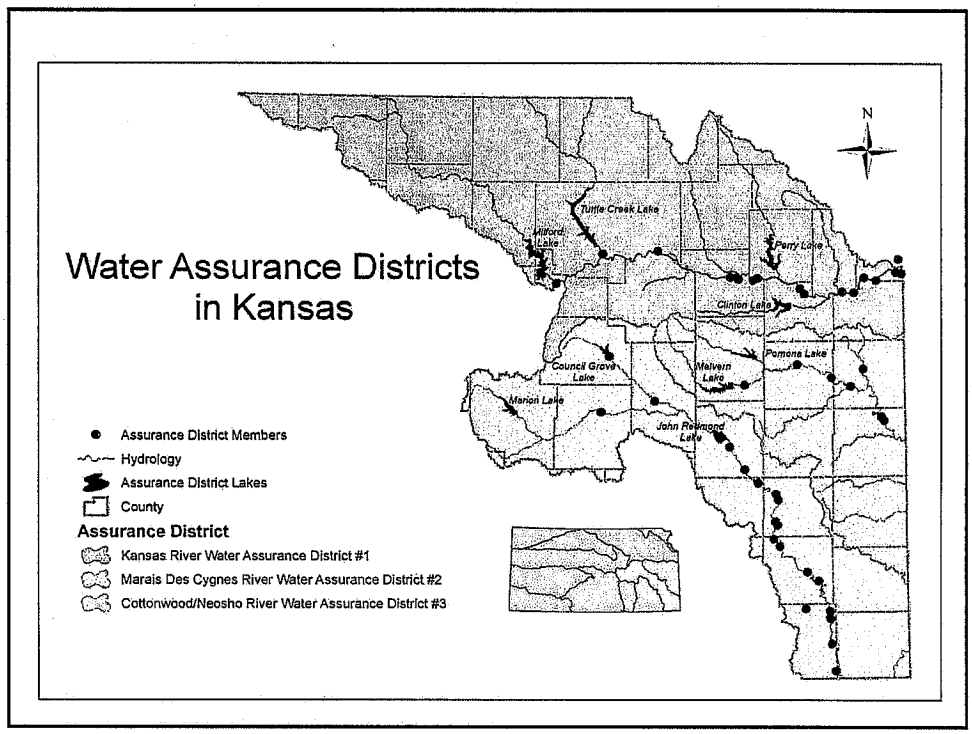
- 25 districts formed since 1977
  - 12 Active
  - 3 Under Development
  - 2 Still Talking
  - 8 Dissolved, Inactive or Unknown
- 101 Cities and RWD's are members of active districts
- 7 of the 12 active districts purchase water from the state

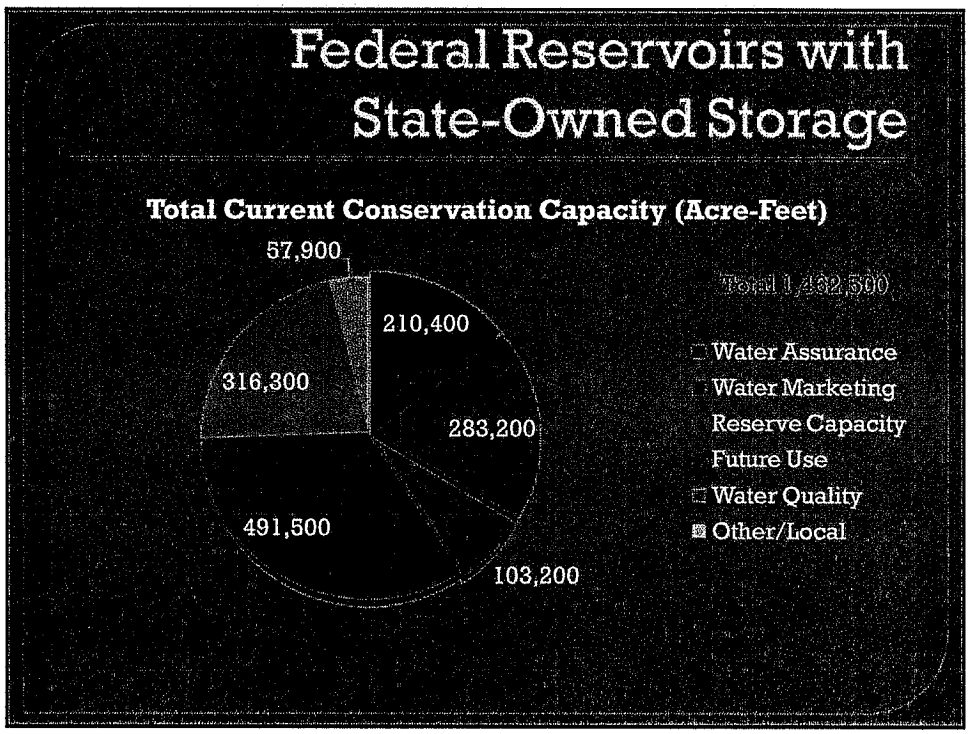
PWWSD #23



KANSAS WATER ASSURANCE DISTRICTS

- Act enacted in 1986
- Purpose –Coordinated use of state-owned storage during drought (M & I)
- Three districts formed
  - Kansas River (15 members)
  - Marais Des Cygnes River (8 members)
  - Cottonwood/Neosho River (19 members)

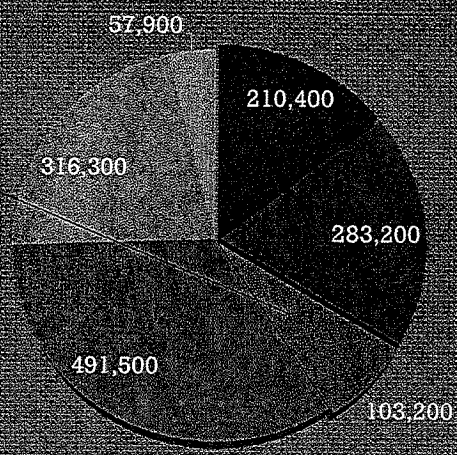

Water Assurance Districts in Kansas
N
Tuttle Creek Lake
Milford Lake
Perry Lake
Clinton Lake
Council Grove Lake
Melvern Lake
Pomona Lake
Marion Lake
John Redmond Lake
Assurance District Members
Hydrology
Assurance District Lakes
County
Assurance District
Kansas River Water Assurance District #1
Marais Des Cygnes River Water Assurance District #2
Cottonwood/Neosho River Water Assurance District #3


Federal Reservoirs with State-Owned Storage
Total Current Conservation Capacity (Acre-Feet)
57,900
210,400
316,300
283,200
491,500
103,200
Total 1,462,500
Water Assurance
Water Marketing
Reserve Capacity
Future Use
Water Quality
Other/Local

Kansas Water Marketing Reservoirs

RESERVE CAPACITY

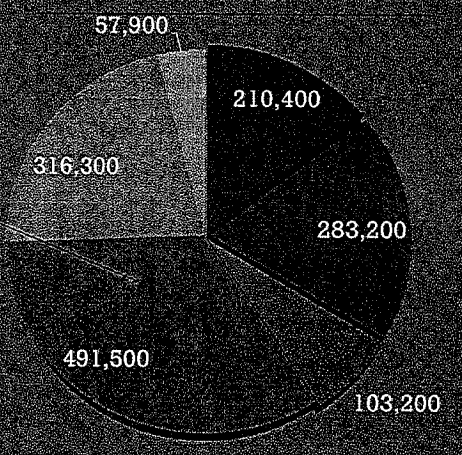
- Council Grove
- Elk City
- Marion
- Melvern
- Pomona
- Tuttle Creek



Kansas Water Marketing Reservoirs

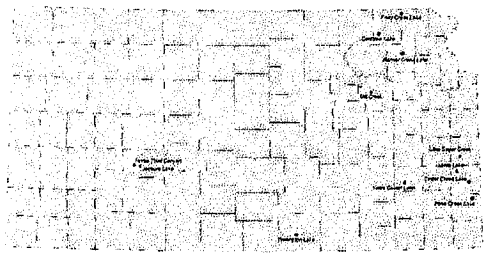
FUTURE USE STORAGE

- Big Hill
- Clinton
- Hillsdale
- Milford
- Perry



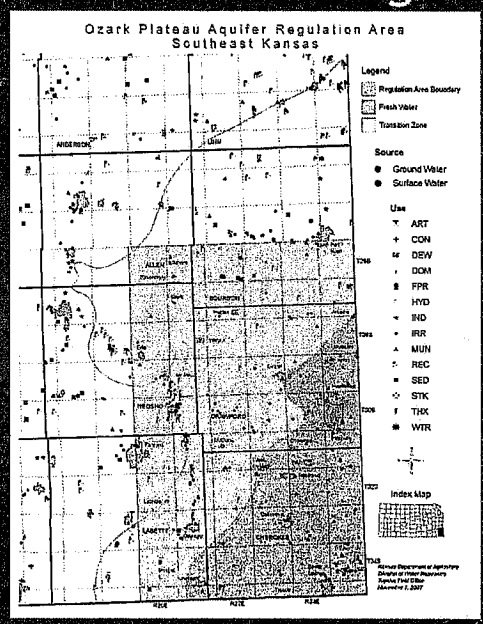
MULTIPURPOSE SMALL LAKES

- Enacted in 1985
- 12 lakes constructed
- 11 contain public water supply storage
- 6 contain storage owned by KWO



Challenges

- The Ozark aquifer is currently the source for most public water supplies in southeast Kansas.



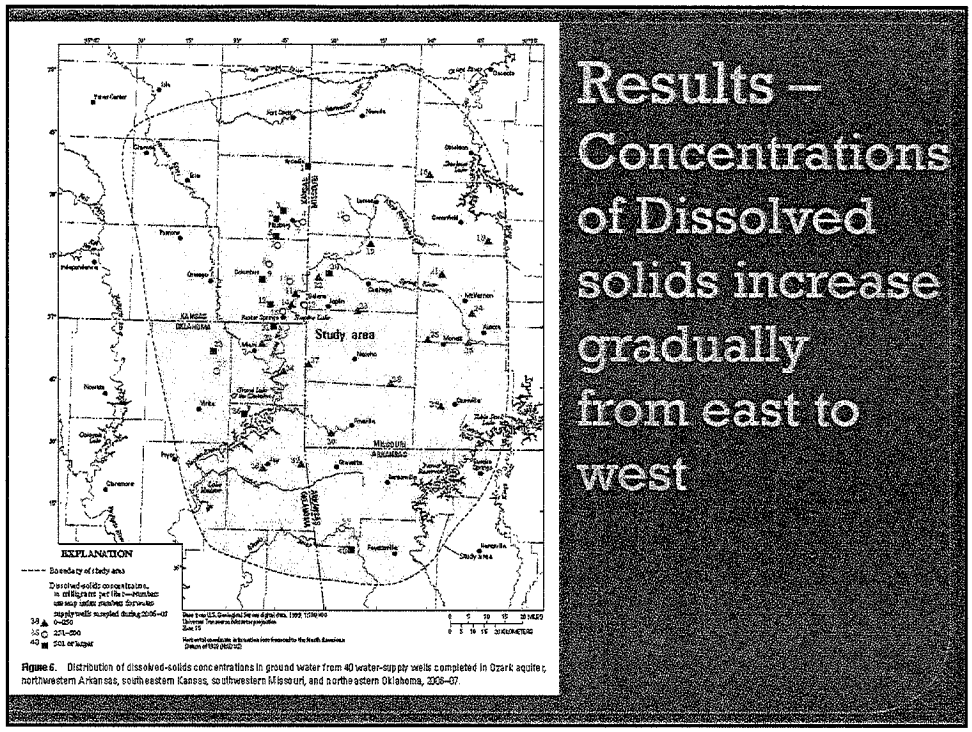


Figure 6. Distribution of dissolved-solids concentrations in ground water from 40 water-supply wells completed in Ozark aquifer, northwestern Arkansas, southeastern Kansas, southwestern Missouri, and northeastern Oklahoma, 2006–07.

Results – Concentrations of Dissolved solids increase gradually from east to west

Ozark Study Results

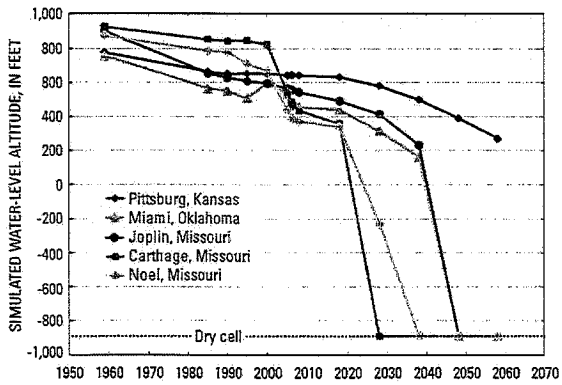


Figure 34. Simulated water-level altitude with time at five pumping centers in the model area for hypothetical scenario 5.

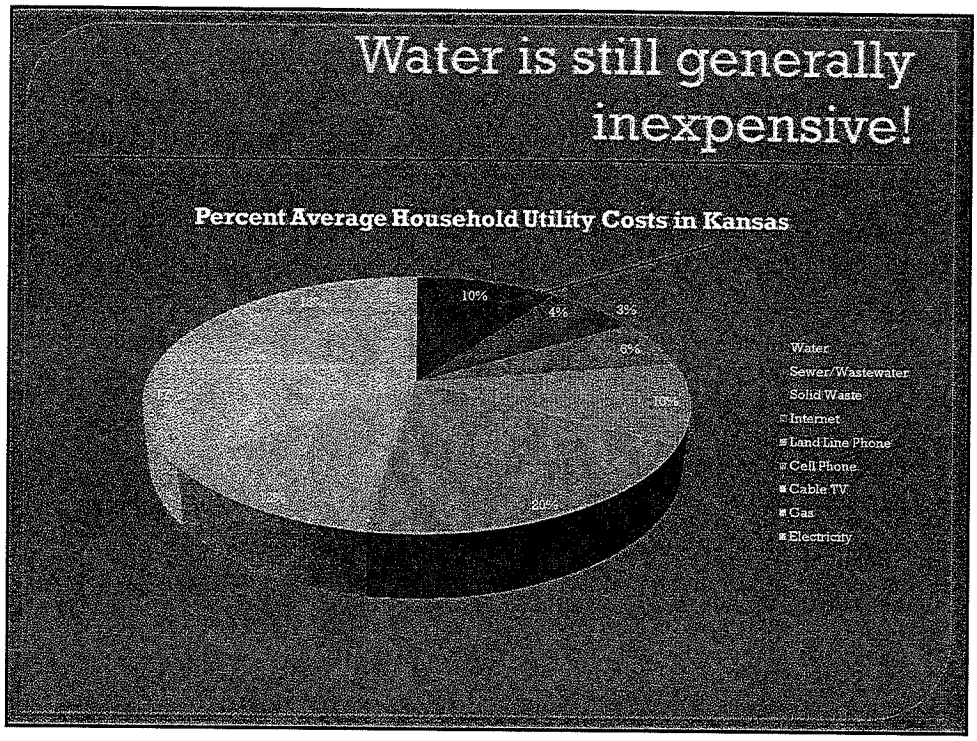
More Challenges

- Missouri River Degradation
  - Threat to infrastructure
  - Increase need for storage releases
- Reservoir Storage Reallocation
  - John Redmond, Wilson, Kanopolis, Lovewell
  - Trade offs

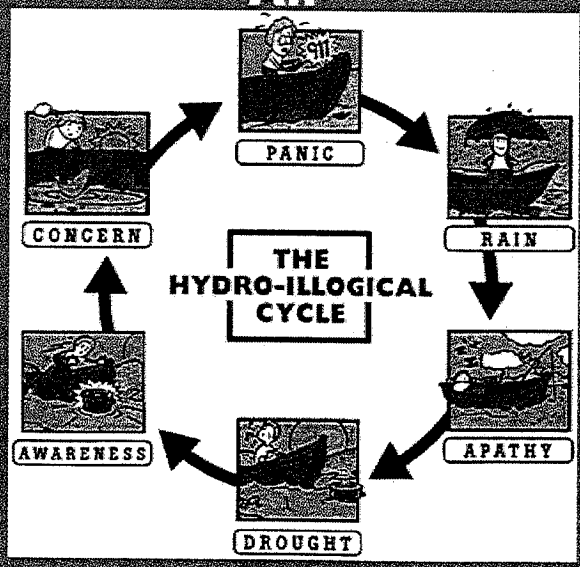
More Challenges

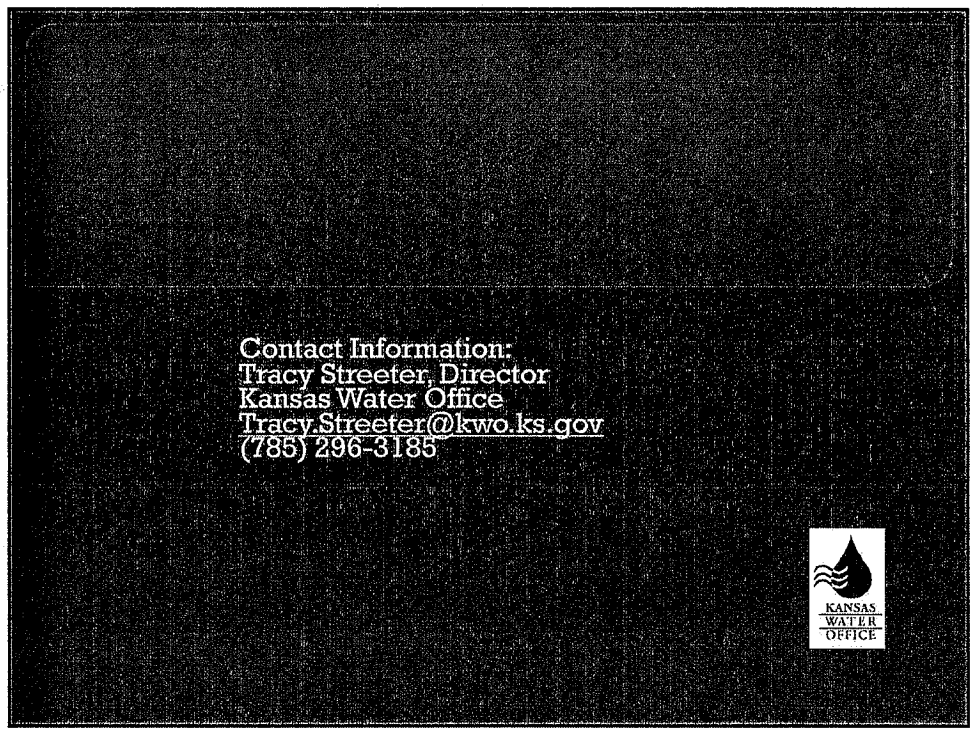
- Competing Needs
  - Drinking Water
  - Energy
  - Industrial
  - Economic Development
  - Recreation
  - Fish & Wildlife

Water is still generally inexpensive!



The Biggest Challenge Of All

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(785) 296-3185
KANSAS
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KANSAS GEOLOGICAL SURVEY
The University of Kansas

Kansas Geological Survey

Public Information Circular 18

September 2001
Revised December 2009

The High Plains Aquifer

Rex C. Buchanan, **Robert R. Buddemeier**, and **B. Brownie Wilson**
Kansas Geological Survey

Introduction

The High Plains aquifer, which includes the well-known Ogallala aquifer, is the most important water source for much of western and central Kansas (fig. 1), supplying 70% of the water used by Kansans each day. Water from the High Plains aquifer supports the region's cities, industry, and much of its agriculture.

However, large-volume pumping from this aquifer has led to steadily declining water levels in the western portion of the region, and the area faces several critical water-related issues. This Public Information Circular describes the High Plains aquifer, the effect of decades of large-volume pumping, and some responses to water issues in central and western Kansas.

The High Plains aquifer system lies beneath parts of eight states in the Great Plains, including about 30,500 square miles of western and central Kansas

The High Plains Aquifer Defined

Aquifers are underground deposits containing permeable rock or sediments (silts, sands, and gravels) from which water can be pumped in usable quantities. The High Plains aquifer is a regional aquifer system composed of several smaller units that are geologically similar and hydrologically connected—that is, water can move from one aquifer to the other. The High Plains aquifer system lies beneath parts of eight states in the Great Plains, including about 30,500 square miles of western and central Kansas (fig. 1).

Aquifer characteristics are determined in large part by geology. The High Plains aquifer is composed mainly of silt, sand, gravel, and clay—rock debris that washed off the face of the Rocky Mountains and other more local sources over the past several million years. The aquifer varies greatly from place to place: thick in some places, thin in others; permeable (able to transmit water easily) in some places, less so in others. Where the deposits are thick and permeable, water is easily removed and the aquifer can support large volumes of pumping for long periods. In most areas, this water is of good quality.

The most important component of the High Plains aquifer is the Ogallala aquifer, generally the western half of the High Plains aquifer in Kansas. In some locations (such as Lake Scott State Park in Scott County), the Ogallala Formation crops out at the surface, forming a naturally cemented rock layer called mortarbeds. In the subsurface, the Ogallala largely consists of silt and clay beds that are interlayered with sand and gravel that is mostly unconsolidated, or not naturally cemented together.

The south-central extension of the High Plains aquifer is composed of younger sediments that are similar to the Ogallala. These younger sediments,

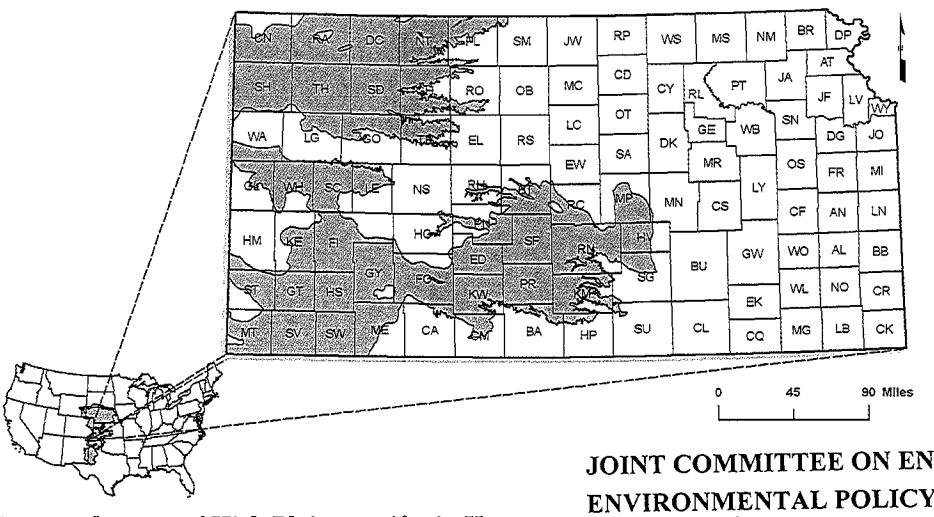

Figure 1—*Saturated extent of High Plains aquifer in Kansas.*

JOINT COMMITTEE ON ENERGY AND ENVIRONMENTAL POLICY
DATE: 10/7/10
ATTACHMENT 2

In the year 2000, about 21 million acre-feet of ground water was removed from the High Plains aquifer across the eight-state region

deposited during the Pleistocene Epoch, or Ice Ages, include the "Equus beds" aquifer (in McPherson, Reno, Harvey, and Sedgwick counties) and the "Great Bend Prairie aquifer" (in Stafford, Edwards, Pratt, Kiowa, and other counties). Also lying above the Ogallala Formation are other Pleistocene deposits and other younger deposits in the valleys of modern streams. Where these stream deposits (known as alluvium) are connected to the Ogallala or Pleistocene aquifers, the alluvial aquifers are considered part of the High Plains aquifer (fig. 2).

Beneath the High Plains aquifer is older, consolidated bedrock, usually limestone, sandstone, or shale (fig. 3). In some places this bedrock holds enough water to be called an aquifer, and it may be connected to the overlying aquifer. Layers of permeable sandstone in the Dakota Formation, for example, are connected to the High Plains aquifer in parts of southwestern or south-central Kansas. Some layers of the underlying bedrock contain saltwater; where these are directly connected to the High Plains aquifer, they pose a threat to water quality.

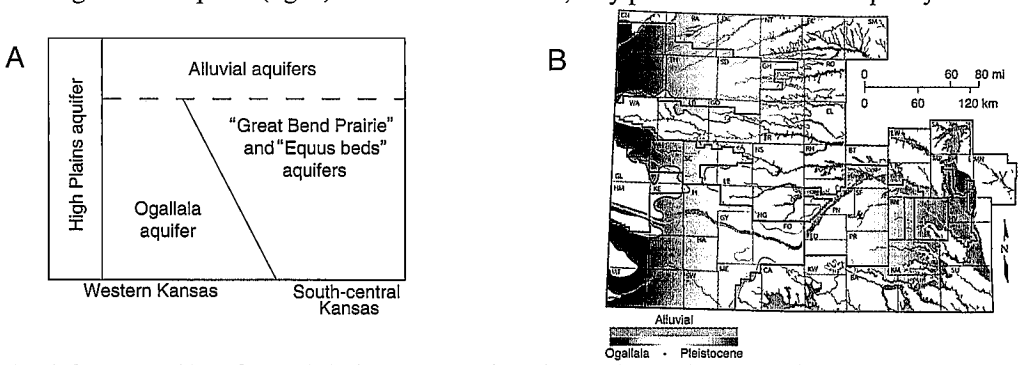

Figure 2—*Schematic (A) and map (B) showing aquifers that make up the High Plains aquifer.*

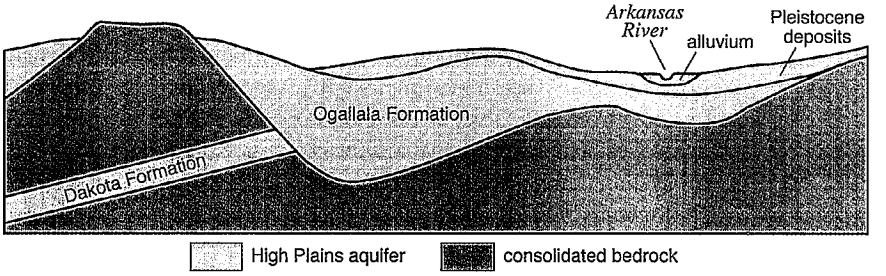

Figure 3—*Generalized cross section showing the High Plains aquifer and underlying bedrock. The Ogallala Formation, Pleistocene deposits, and alluvium combine to form the High Plains aquifer.*

Water Resources in the High Plains Aquifer

Usable water in the High Plains aquifer is in the pore spaces between particles of sand and gravel. This water (called ground water) accumulated slowly—in some of the deeper parts of the aquifer, over tens of thousands of years. In the subsurface, water in the aquifer generally moves slowly from west to east, usually at the rate of tens of feet per year.

Recharge is the natural movement of water into an aquifer, usually from precipitation. Natural recharge to the High Plains aquifer from precipitation is low, in part because much of the rain falls during the growing season, when plant roots intercept the soil moisture. In western Kansas, where precipitation is scant and the water table is relatively deep (several hundred feet) in many places, recharge occurs infrequently and the long-term average is less than an inch per year. In central Kansas, where the aquifer is closer to the land surface, where soils are sandier, and precipitation amounts greater, recharge can be significant, as much as 4 to 6 inches per year.

Water volumes and use are measured in various ways. One measure is an acre-foot, or the amount of water necessary to cover an acre of ground (a parcel about the size of a football field) with a foot of water. An acre-foot equals 325,851 gallons of water. In the year 2000, about 21 million acre-feet of ground water was removed from the High Plains aquifer eight-state region (McGuire, 2009). In Kansas, the High Plains aquifer yielded 4.4 million acre-feet, of which 2.4 million acre-feet came from the Ogallala aquifer in 2007. Estimated average annual natural recharge to the Ogallala in Kansas is 0.72 million acre-feet.

Another measure of ground water is saturated thickness—the thickness of the sands, gravels, and other materials that are saturated with water. Saturated thickness is commonly measured in feet, but "feet of saturated thickness" is not the same as feet of actual water. Only about 10 to 25% of the aquifer volume is pore space that can yield extractable water. Therefore, in an aquifer with 17% pore space, removing 1 acre-foot of water causes the water table to drop by about 6 feet. In Kansas, saturated thickness in the High Plains aquifer is generally greatest in the southwestern part of the state (see fig. 4). There, saturated thicknesses of 300 feet and greater were common before the onset of large-scale irrigation, a time that is often called "pre-development."

2-2

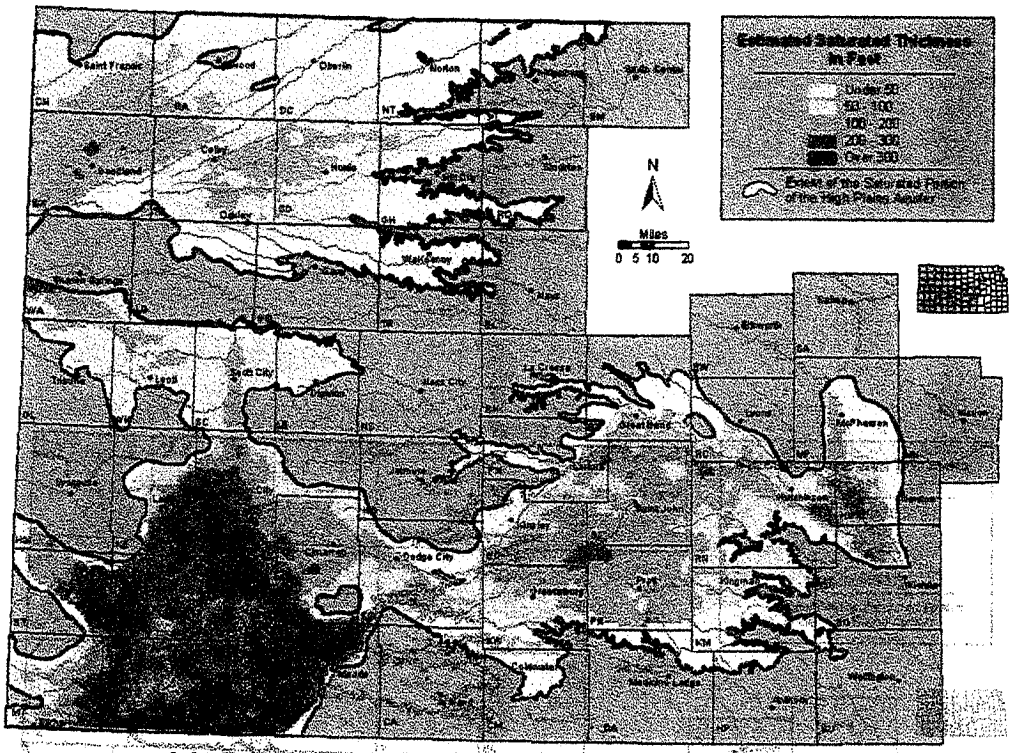

Figure 4—*Predevelopment saturated thickness for the High Plains aquifer in Kansas.*

Ground water can also be measured in terms of its availability: how much water can be removed by a well over short periods. Large volumes of water can be pumped rapidly (1,000 gallons or more per minute) from the High Plains aquifer in many locations. This contrasts with much of the rest of the state, where wells generally produce smaller amounts (less than 100 gallons per minute). By way of comparison, a good household well produces 5 to 10 gallons per minute, although many household wells produce less.

Water-level Declines in the Aquifer

Large-scale irrigation began in western Kansas in the late 1800's, with the use of ditches to divert water from the Arkansas River. As technology improved, ground water became the major irrigation source because surface water (lakes, rivers, and streams) is relatively scarce in western Kansas. With the advent of large-capacity pumps that were capable of drawing several hundred gallons of water per minute, people began to develop that ground water. Using a technique called flood irrigation, water was pumped through long pipes or ditches along the edges of a field, then out onto rows of crops (fig. 5A).

In the 1950's and 1960's, technological developments led to a dramatic increase in large-scale pumping. In particular, center-pivot irrigation systems—large sprinklers that roll across the land on wheels—allowed people to irrigate uneven terrain, thus opening up large new areas for irrigation (fig. 5B). These irrigation methods led to the cultivation of crops, such as corn, that could not previously be grown reliably in the area. That grain production led, in turn, to large feedlots and packing plants and a boom in the economy of much of western Kansas, all largely dependent on ground water. One study in 2001 estimated that the economic

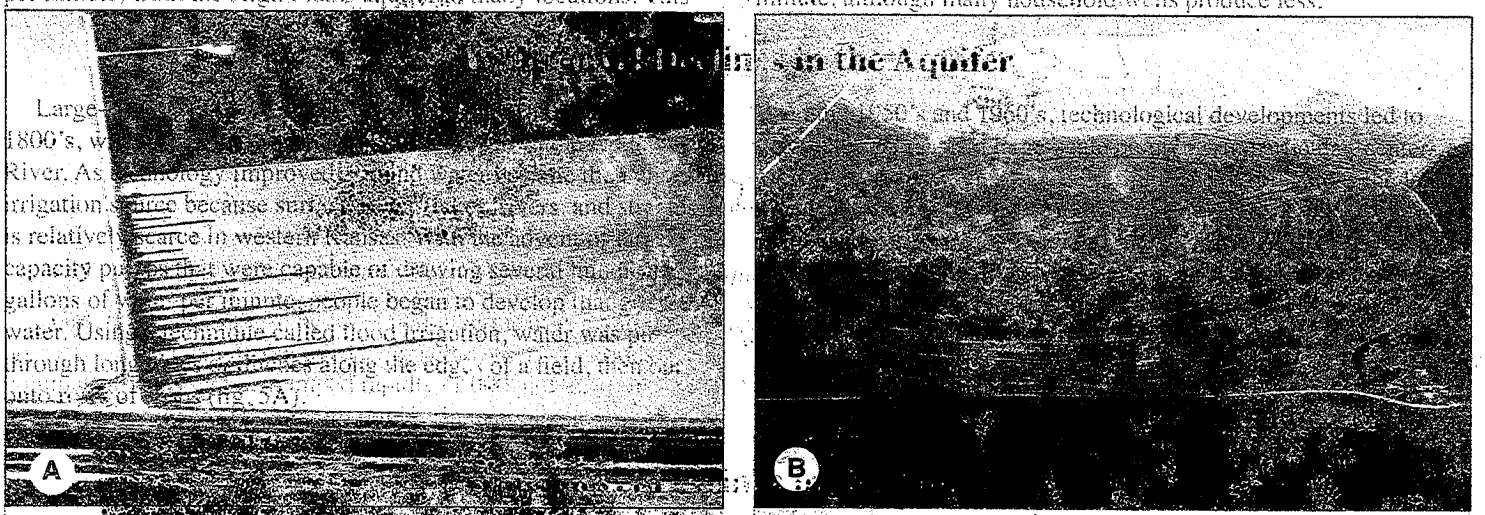

Figure 5—*Center-pivot irrigation (photos courtesy of Tom Schmiedeler, Washburn University).*

impac[illegible]igation in southwestern Kansas alone amounts to more than $188 million annually (Gilson et al., 2001).

For many years, people believed that the High Plains aquifer contained an inexhaustible amount of water. However, large-volume pumping (mostly for irrigation) eventually led to substantial declines in the water table, and people realized that the amount of water in the aquifer was finite and could be exhausted. Much of the Ogallala portion of the High Plains aquifer has declined since predevelopment, with some areas having declines of more than 60% (fig. 6).

Nonetheless, in much of the aquifer, considerable amounts of water remain. For example, declines of 100 feet or more may have occurred in parts of southwestern Kansas, but that represents less than half of the original saturated thickness, and 100 to 200 feet (or more) of saturated thickness may remain. On the other hand, in parts of west-central Kansas—such as Greeley, Wichita, Scott, and northern Finney counties—the original saturated thickness was much less, often less than 100 feet. In these places, where early flood-irrigation systems were prevalent, less than 50 feet of saturated thickness remains.

When Will the Aquifer Run Dry?

Perhaps the most common and important question about the High Plains aquifer is: How much longer can it support large-scale pumping? It's a simple question with a complicated answer. First, the aquifer will probably be able to support small, domestic wells far into the future. With proper planning, most cities and towns should be able to provide for their water needs. Second, the future of agricultural use of the aquifer depends on a variety of factors, including the price of irrigated crops, the price and availability of energy (the deeper the water table, the more energy it takes to pump water), climate, and how the water is managed. Third, it is important to remember that the aquifer is not one consistent, homogeneous unit. Rather, it varies considerably from place to place. In places, the aquifer consists of less than 50 feet of saturated thickness and receives little recharge. In other places, the aquifer is far thicker or receives considerably more recharge.

With those qualifications in mind, researchers at the Kansas Geological Survey have made projections about the aquifer, based on past trends in water-level declines. Obviously, the actual future use of water will be affected by commodity prices, energy prices, climate, and management policies. Relatively little data are available for some parts of the aquifer, and projections are not practical in those areas. Assuming saturated thickness sufficient to support pumping of at least 400 gallons per minute, researchers concluded that parts of the aquifer are effectively exhausted in Greeley, Wichita, and Scott counties (fig. 7). Other parts of the aquifer, in areas such as southwestern Thomas County, are projected to have a lifespan of less than 25 years, based on past decline trends. However, the biggest share of the aquifer in southwest Kansas would not be depleted for 50 to 200 years. It is important to remember that these projections are based solely on past water-level trends, and future changes could alter the actual depletion rate.

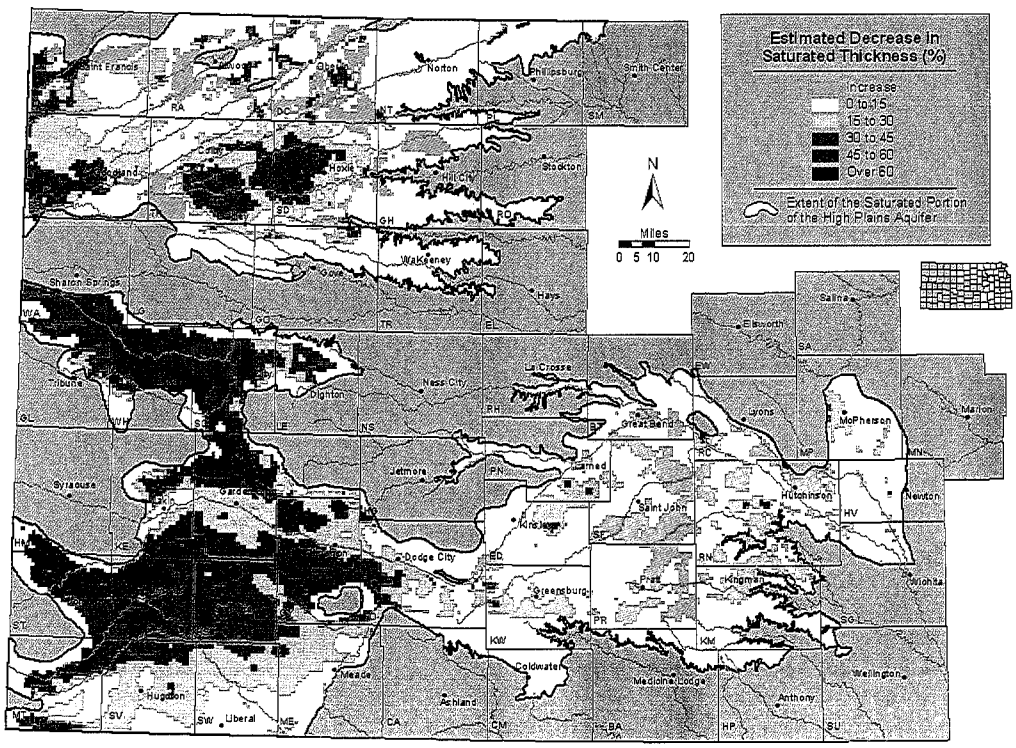

Figure 6—*Percent change in saturated thickness for the High Plains aquifer in Kansas, predevelopment to 2007–09.*

Much of the Ogallala portion of the High Plains aquifer has declined since predevelopment, with some areas having declines of more than 60%

By Kansas law, water is a public resource that is dedicated to the people of the state

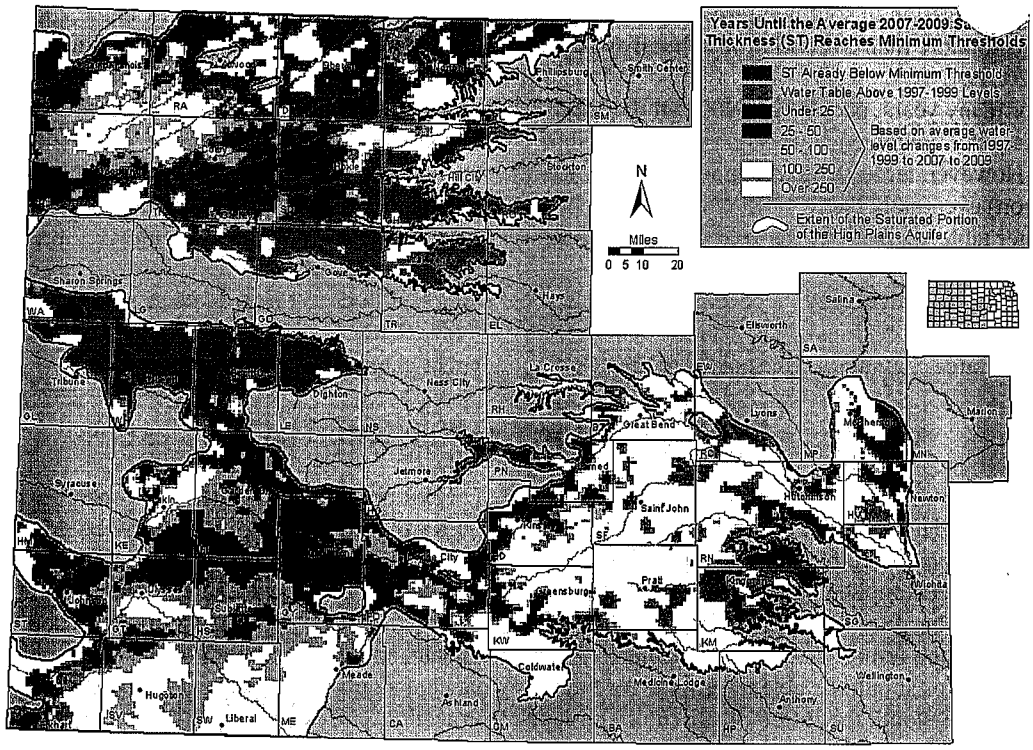

Figure 7—*Estimated usable lifetime (1998–2008) trend for the High Plains aquifer in Kansas.*

Managing Water in the Aquifer

By Kansas law, water is a public resource that is dedicated to the use of the people of the state. Individuals, companies, municipalities, and other entities can obtain permission to use water for beneficial purposes by obtaining a water right, either new or existing. In general, all beneficial uses of water, except most domestic use, require a water right. Kansas water law is based on the doctrine of prior appropriation. That is, when there is insufficient water to meet all water rights, the date of the water right determines who has the right to use the water. This doctrine is commonly expressed as "First in time, first in right."

Responsibility for managing water use in Kansas is spread over several agencies. The Division of Water Resources of the Kansas Department of Agriculture is responsible for administering water rights, and thus is primarily responsible for regulation related to the quantity of water used. Water issues also are subject to local control and management. Five groundwater management districts have been created in Kansas to provide local management of the resource within the framework of the State's water laws. Together, they cover nearly all of the state underlain by the High Plains aquifer (fig. 8). Groundwater management districts, through staff and an elected board, develop and implement policies and rules and regulations to manage and protect the quality of water, undertake educational activities,

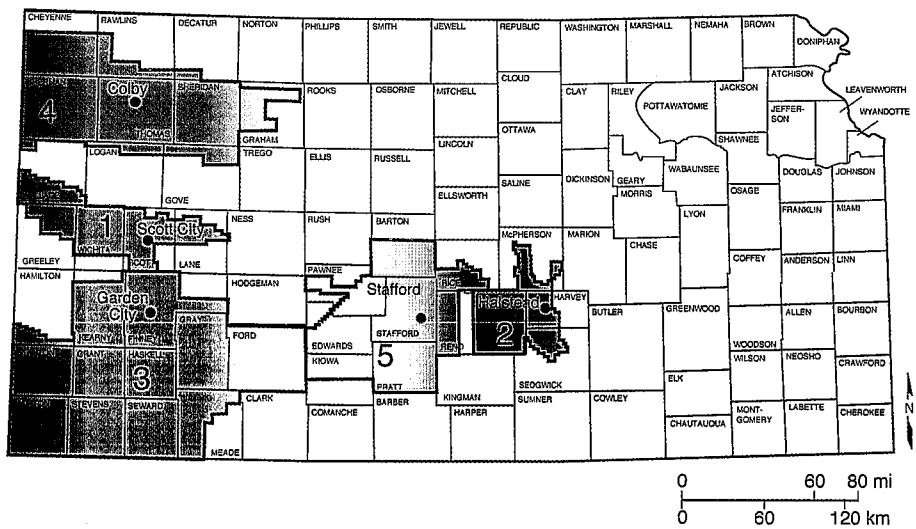

Figure 8—*Groundwater management district boundaries in Kansas.*

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and work with State and Federal water-related agencies to regulate and manage the High Plains aquifer.

A variety of other agencies deal with other aspects of water in the state. The Kansas Geological Survey, for example, a research and service division of the University of Kansas, undertakes a variety of water-related activities, but has no regulatory responsibility. The Kansas Department of Health and Environment monitors water-quality issues. The Kansas Water Office, working with the Kansas Water Authority, is responsible for water planning. That plan[illegible] according to drainage basins, or areas that are drained by a common stream, such as the Cimarron River or Neosho River. Each of those basins is represented by a volunteer basin-advisory committee. The Kansas Department of Wildlife and Parks, Kansas State University's Extension program, the Kansas Biological Survey, the U.S. Geological Survey, and other State and Federal agencies have various responsibilities for water.

Where Do We Go From Here?

Individuals, governmental agencies, and private organizations are all attempting to address issues related to the High Plains aquifer. In addition, several new institutions have recently been proposed to deal with issues concerning the aquifer on a regional basis. Irrigators have implemented a number of techniques that have improved the efficiency with which they use water—using low-pressure application methods on center-pivot systems, for example, instead of spraying water high into the air.

Among the more far-reaching proposals for extending the life of the aquifer is the idea of sustainable development. This is the concept of limiting the amount of water taken from the aquifer to no more than the amount of recharge, and perhaps less, depending on the impact on water quality and minimum streamflows. This level of use is the target of the safe-yield management policies currently in effect in the Big Bend and Equus Beds Groundwater Management Districts in the eastern part of the High Plains aquifer. Adoption of a similar policy in other areas of the High Plains aquifer would require a substantial decrease in the amount of water currently used. This would have an impact on the type and amount of crops grown in western Kansas and, in turn, on a variety of economic activities. Because many of the water rights in the High Plains aquifer were established long ago and thus have priority, the implementation of sustainable-development approaches to water resources has serious legal implications. Other methods for dealing with the High Plains aquifer are being proposed, discussed, and implemented. All are aimed at extending the life of this crucial resource.

[*The authors thank Dave Young, formerly of the Kansas Geological Survey, and Bob Sawin, Kansas Geological Survey, for their help in the preparation of this circular.*]

Additional Reading

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Gilson, Preston, Aistrup, Joseph, Heinrichs, John, and Zollinger, Brett, 2001, The value of Ogallala aquifer water in southwest Kansas: Docking Institute of Public Affairs, Fort Hays State University, 82 p.

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Sophocleous, Marios, ed., 1998, Perspectives on sustainable development of water resources in Kansas: Kansas Geological Survey, Bulletin 239, 239 p.

Web Sites

Kansas Geological Survey — **http://www.kgs.ku.edu/**
Information about water-levels in specific wells is available at **http://www.kgs.ku.edu/Magellan/WaterLevels/** and can be searched by legal description or county.
More information on the High Plains Aquifer is available at **http://www.kgs.ku.edu/HighPlains/index.shtml**

Kansas Department of Agriculture, Division of Water Resources — **http://www.ksda.gov/dwr/**

Kansas Water Office — **http://www.kwo.org/**

U.S. Geological Survey's Water Resources Division Office, Lawrence — **http://ks.water.usgs.gov/**
This site includes current streamflow information.

The mission of the Kansas Geological Survey, operated by the University of Kansas in connection with its research and service program, is to conduct geological studies and research and to collect, correlate, preserve, and disseminate information leading to a better understanding of the geology of Kansas, with special emphasis on natural resources of economic value, water quality and quantity, and geologic hazards.

The Geology Extension program furthers the mission of the KGS by developing materials, projects, and services that communicate information about the geology of Kansas, the state's earth resources, and the products of the Kansas Geological Survey to the people of the state.

Public Information Circular 18
September 2001
Revised December 2009

Kansas Geological Survey
Geology Extension
The University of Kansas
1930 Constant Avenue
Lawrence, Kansas
66047–3724
(785) 864–3965
http://www.kgs.ku.edu

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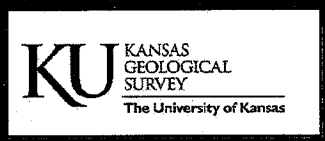
FSC

2-6

Kansas Ground-water Supplies and Availability- A look at the High Plains Aquifer

Joint Committee on Energy and Environmental Policy
October 7, 2010



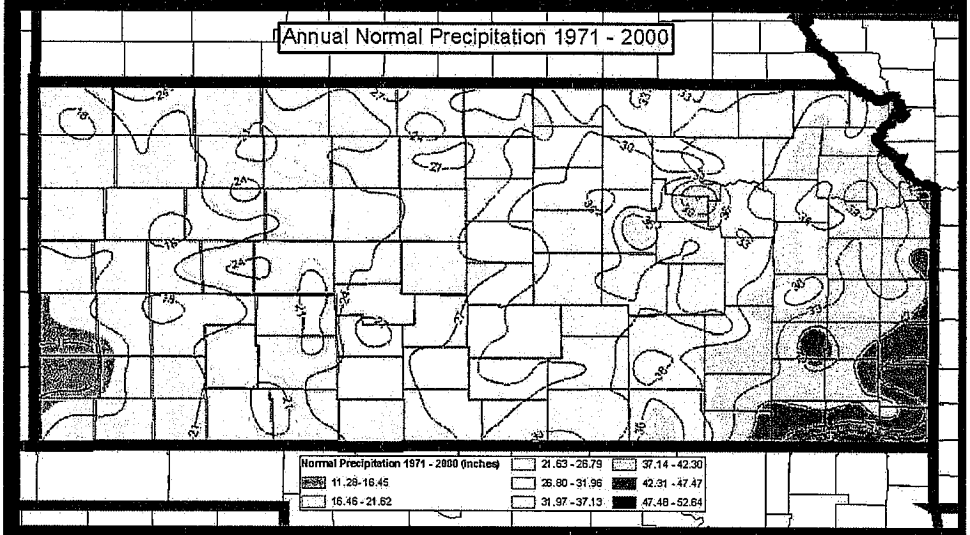
Kansas Geological Survey
University of Kansas

Kansas = Transitional State

Water Resources in Kansas are very different from East to West

JOINT COMMITTEE ON ENERGY AND ENVIRONMENTAL POLICY
DATE: 10/7/10
ATTACHMENT 3

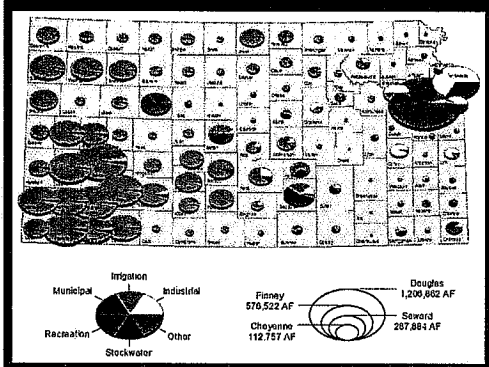
Precipitation in Kansas



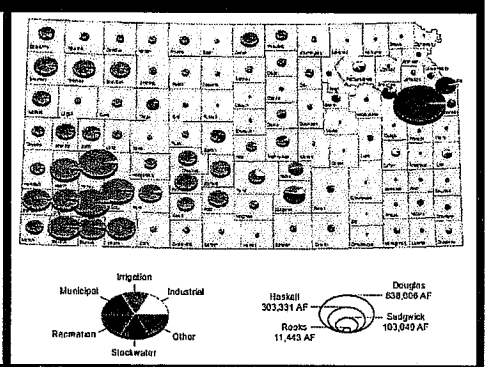
Source- KSU Weather Library

Use Made of Water in Kansas

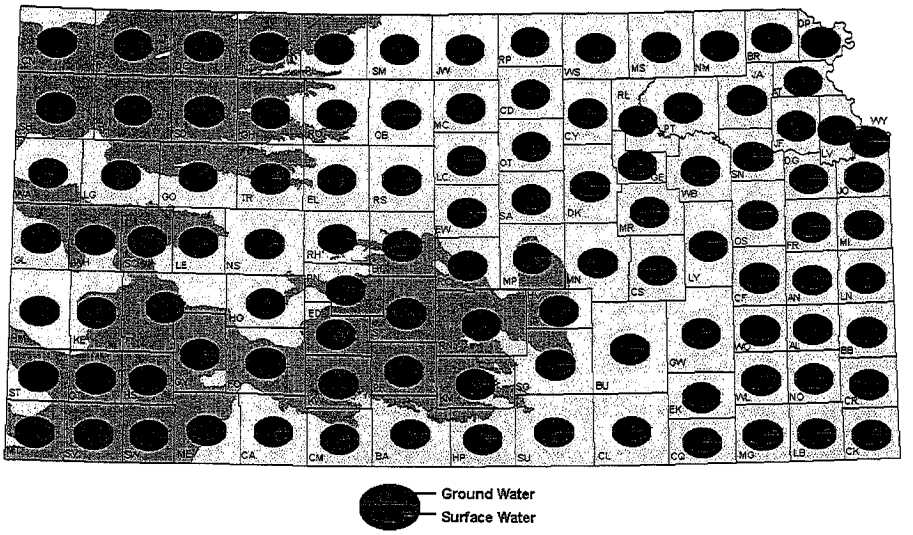
Authorized Quantity



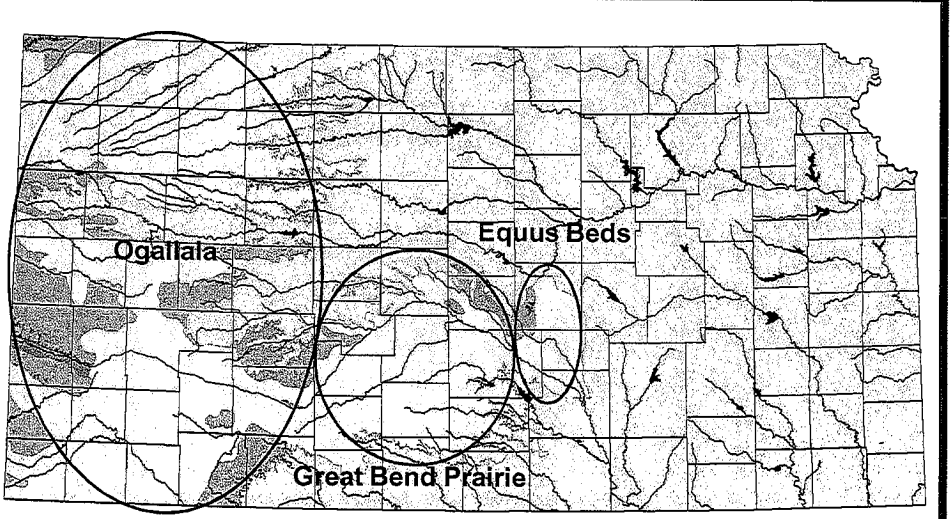
Average Reported Use



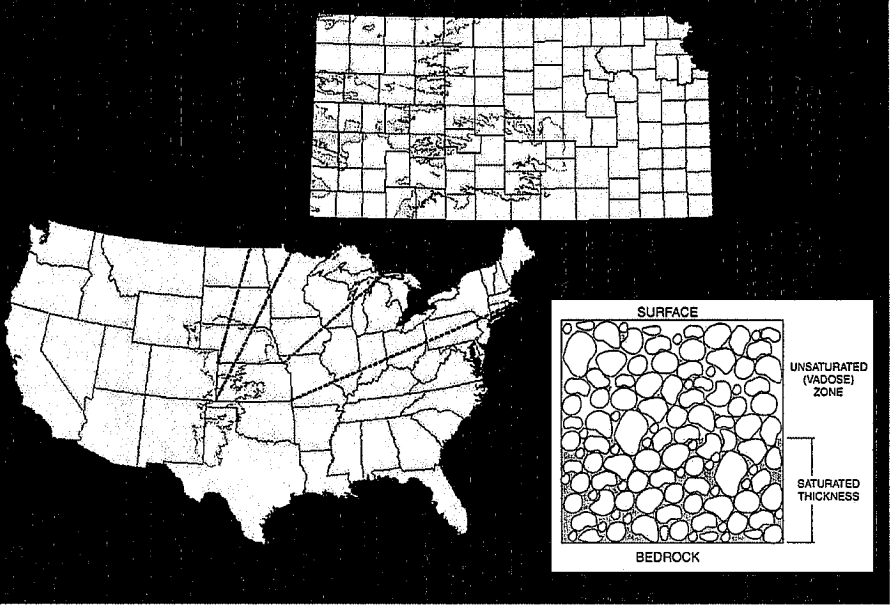
Source of Water- Ground vs Surface



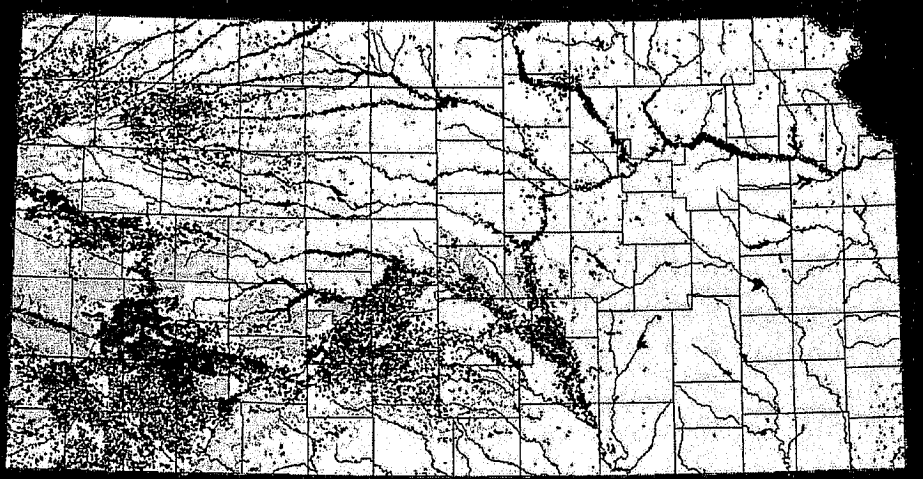
The Kansas High Plains Aquifer



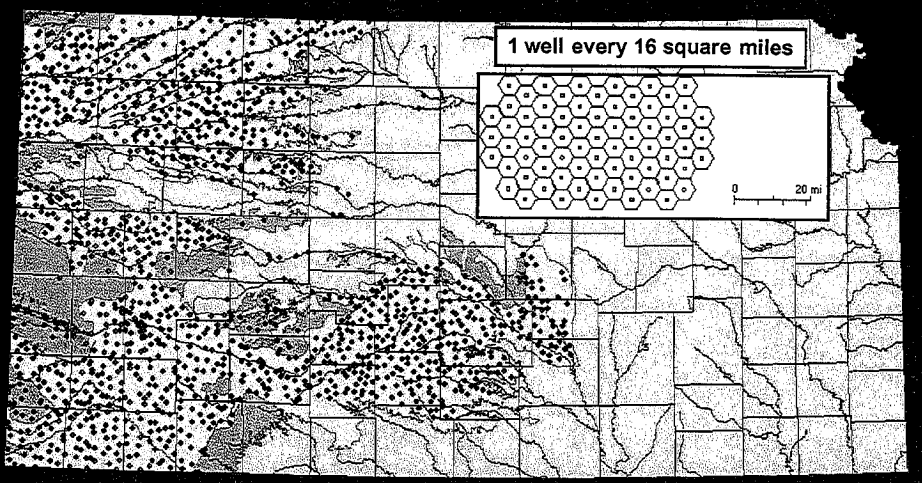
The High Plains Aquifer



Ground-Water Water Right Wells



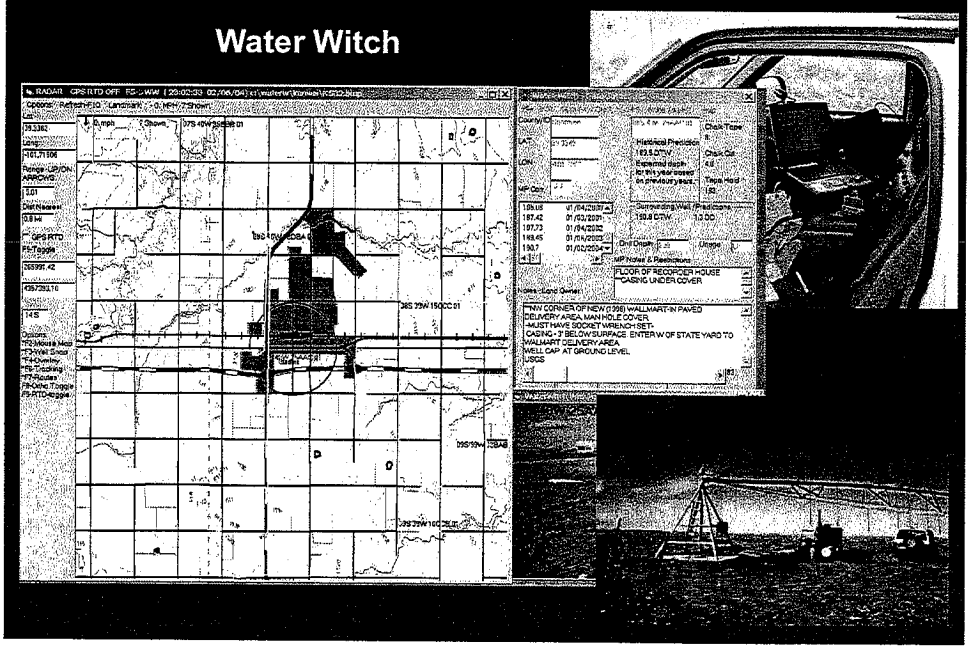
Kansas Cooperative Water Level Program



The network fluctuates around 1400 wells

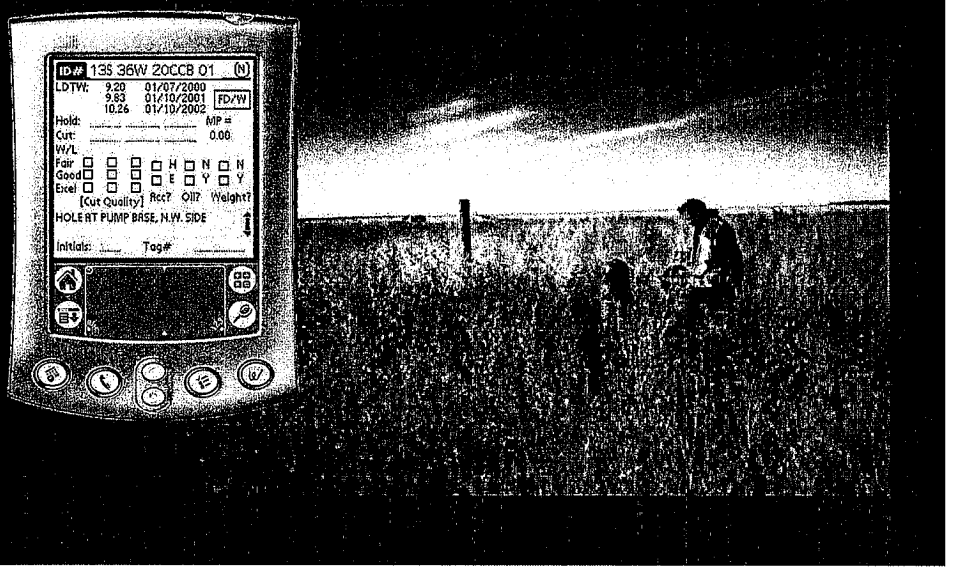
Depth to Ground Water Field Collection

Water Witch

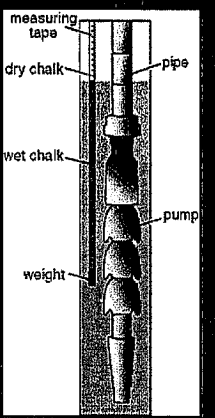


Depth to Ground Water Field Collection

Water Bug

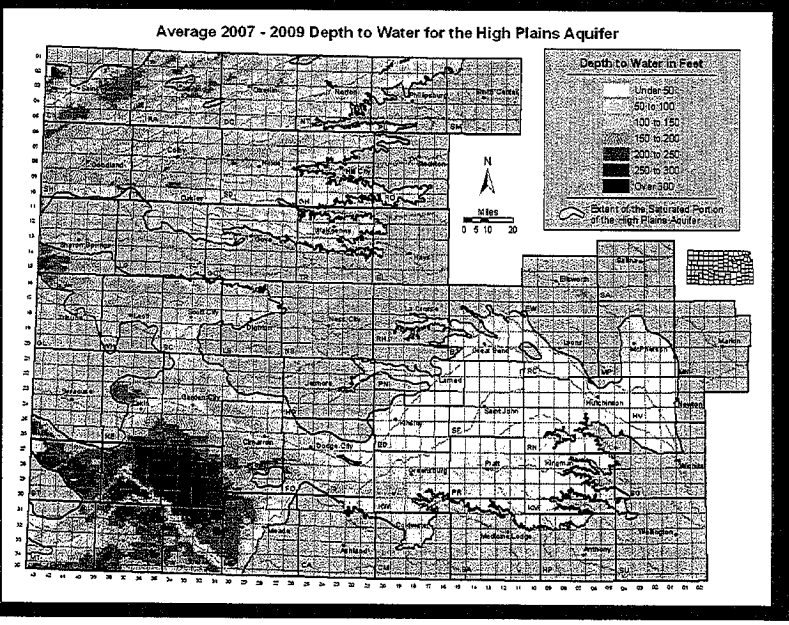


Measuring a well

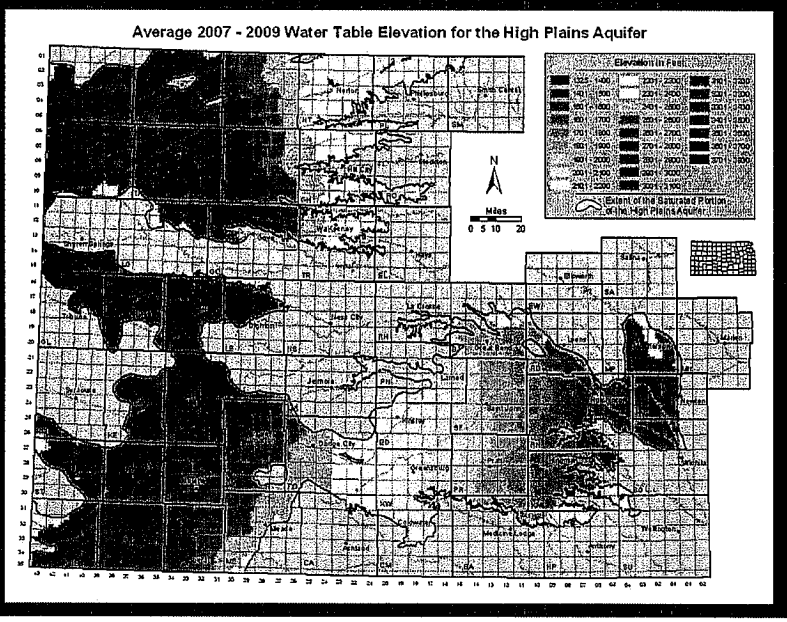


On-Site Data Checking

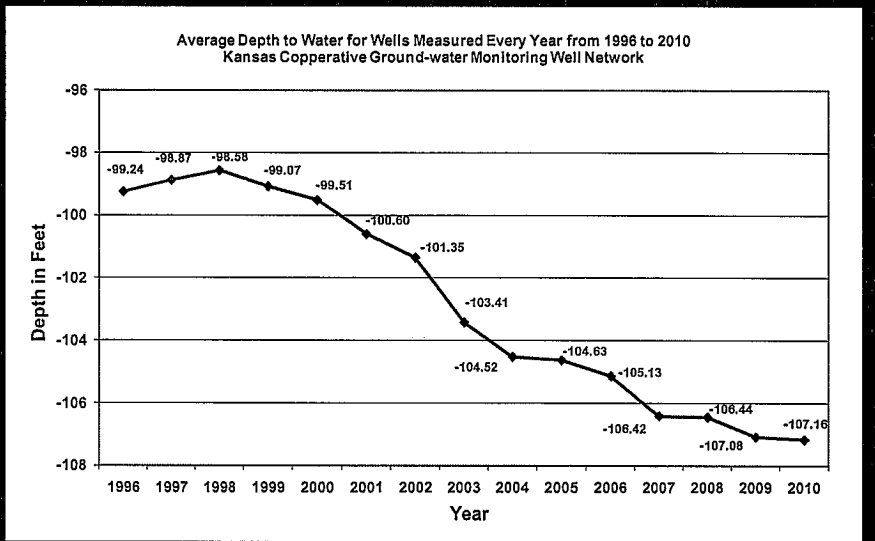
Average 2007-2009 Depth to Water, Kansas High Plains Aquifer



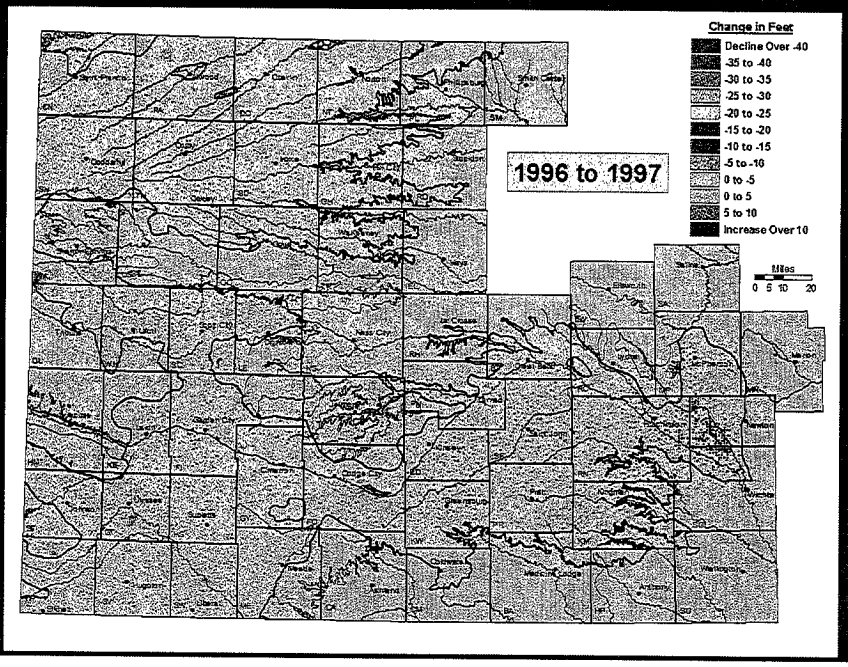
Average 2007-2009 Water Table Elevation, Kansas High Plains Aquifer



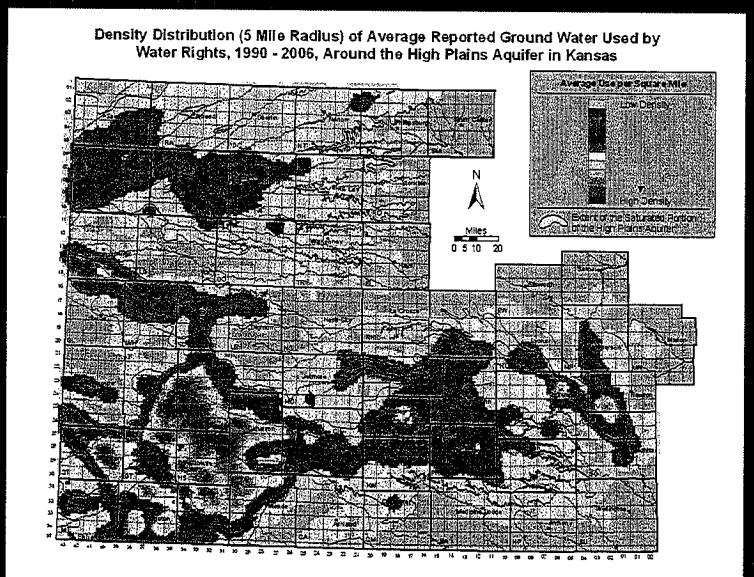
Water Level Trends 1996 to 2010



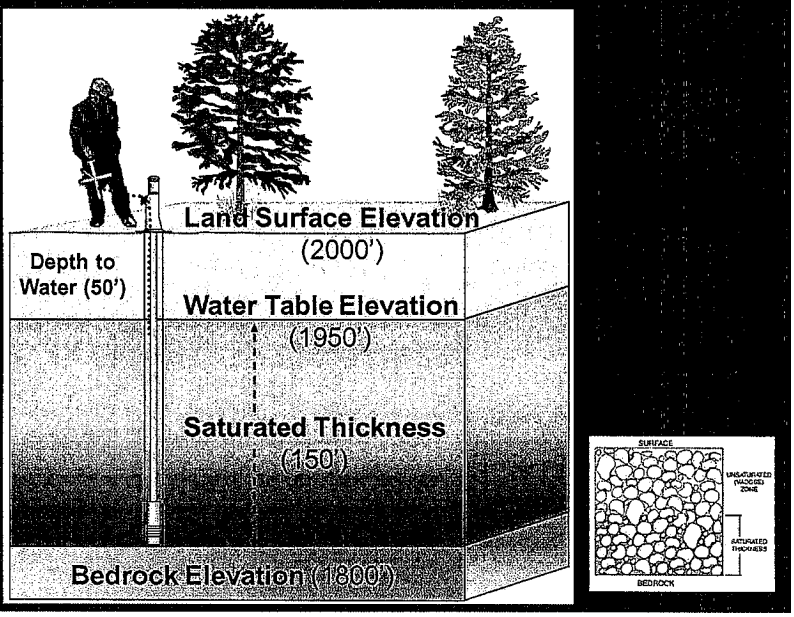
Accumulated Water Level Trends 1996 to 2009



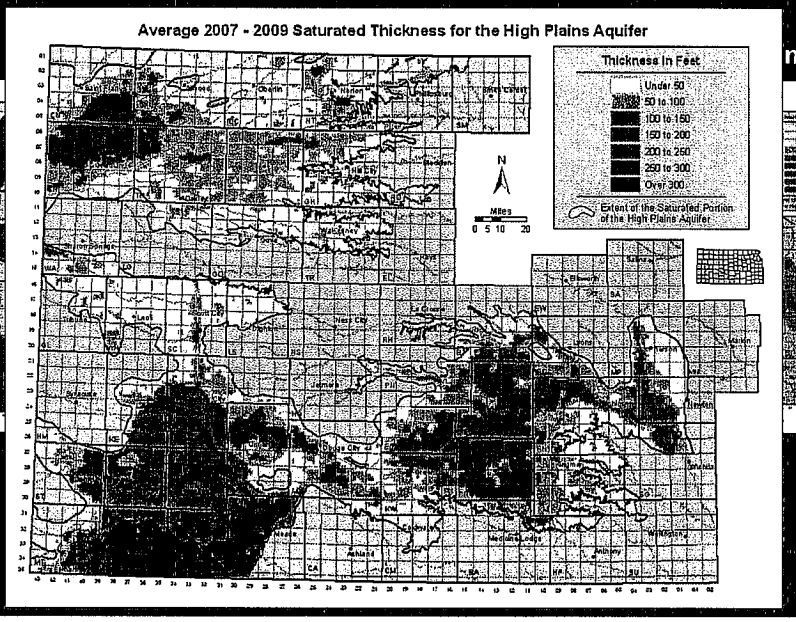
Density of Average Reported Ground Water Used, 1990 to 2006



Water Level Change is Only One Variable- Saturated Thickness is Another



Map Algebra- Estimating the Saturated Thickness

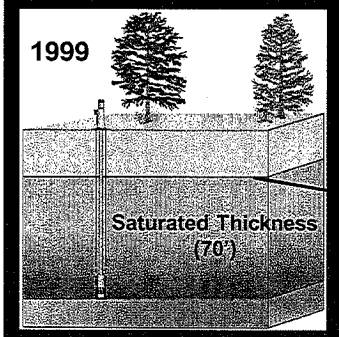


Estimated Usable Lifetime Example

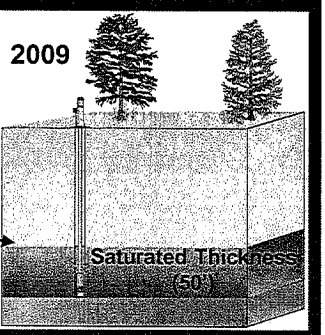
Minimum saturated thickness threshold = 30 Feet

Estimated Usable Lifetime (50' ST with 2' annual decline) = 10 Years

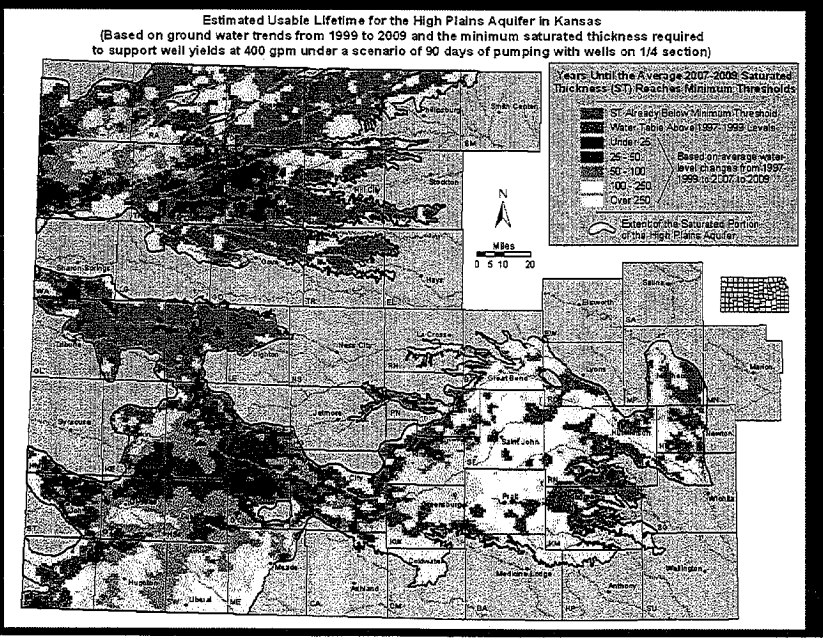
This is a PROJECTION, not a prediction



Decline in the
Water Table
20 Feet
Or 2 Feet
Annually



Estimated Usable Lifetime



Conclusion

- Water resources and usage in Kansas are very different across the state but in total, irrigation is by far the largest user of water
- The High Plains Aquifer is highly variable and is the principal water supply in western and south-central Kansas
- Ground-water decline rates in the Ogallala portion of the High Plains Aquifer have been slowing over the long term but are still very prevalent today, and are accented by drought conditions
- The estimated usable lifetime of the Ogallala Aquifer is dependent on water pumping/consumption as opposed to natural precipitation and recharge
- It is highly unlikely we will completely run out of water
- Adaptation to water supplies

Questions????

Kansas Geological Survey
1930 Constant Ave
Lawrence, KS 66047
785-864-2118

KU KANSAS GEOLOGICAL SURVEY
The University of Kansas

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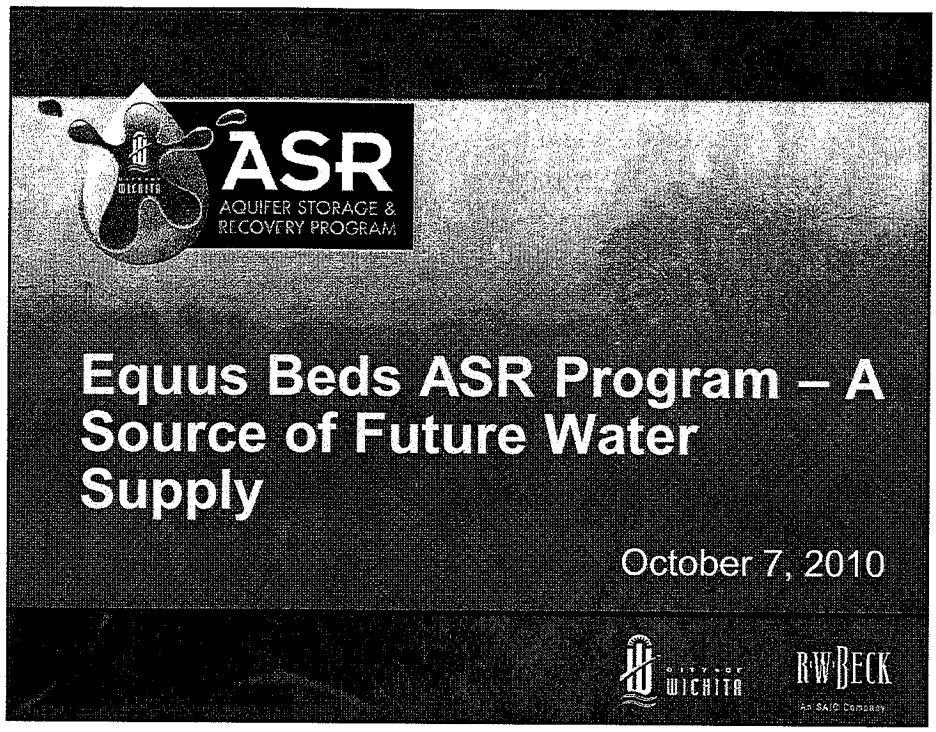
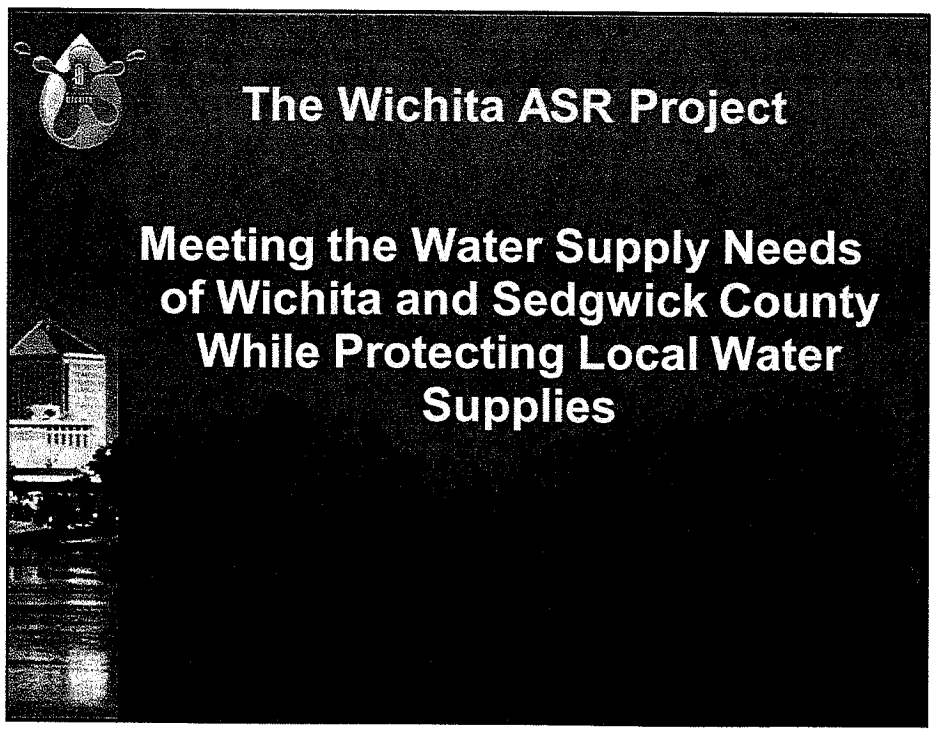


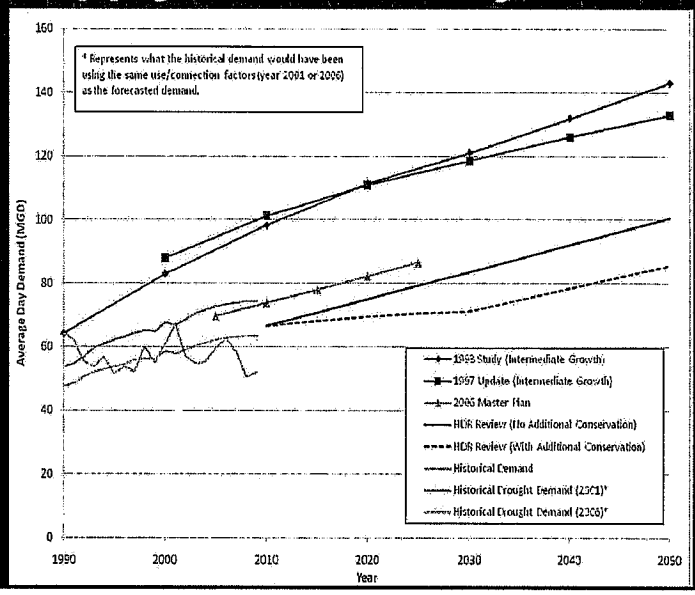


JOINT COMMITTEE ON ENERGY AND ENVIRONMENTAL POLICY
DATE: 10/7/10
ATTACHMENT 4

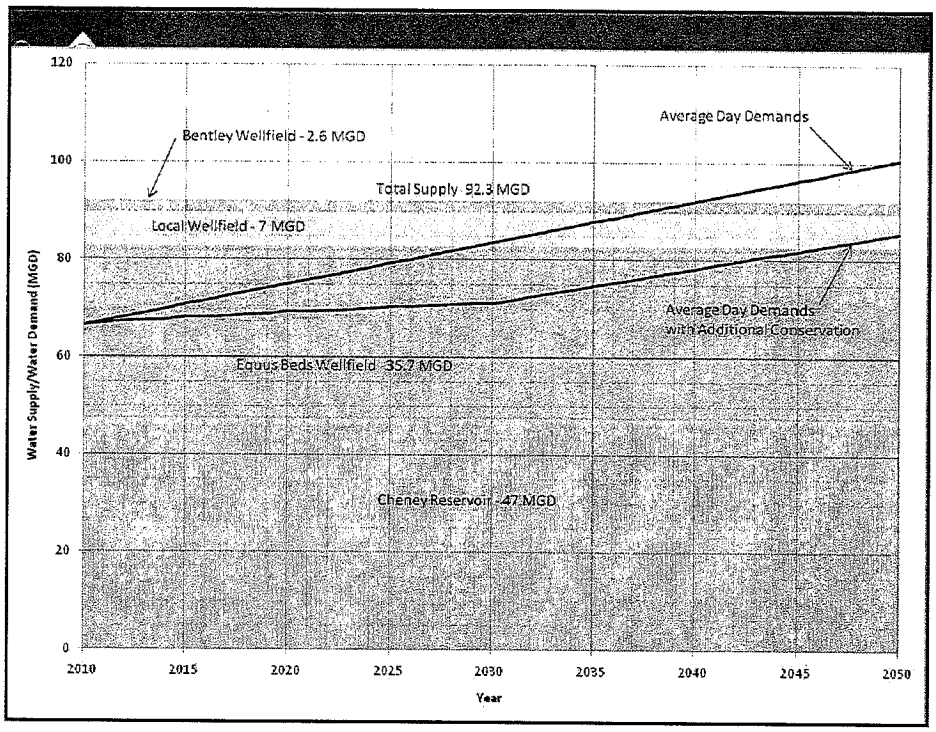
Water Supply Needs

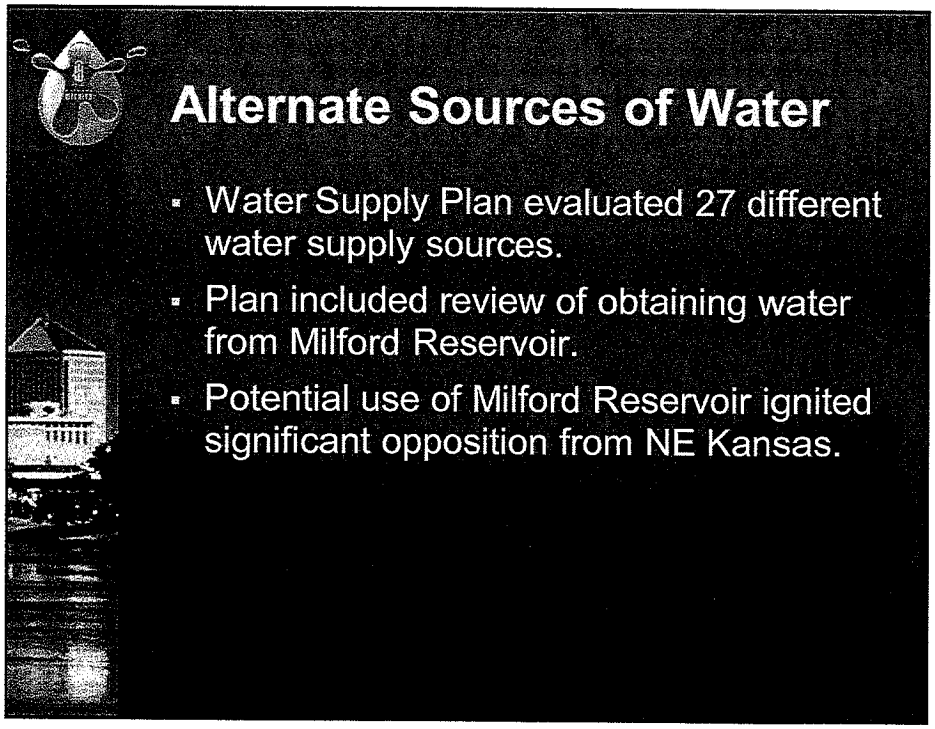
- Water Supply Plan looks to meet the needs that will exist through 2050.
- Planning area – Wichita, all of Sedgwick County and western Butler County
- Average Day demand increases from 60 MGD to 100 MGD
- Peak Day Demand increases from 120 MGD to 200 MGD

Supply/Demand Projections



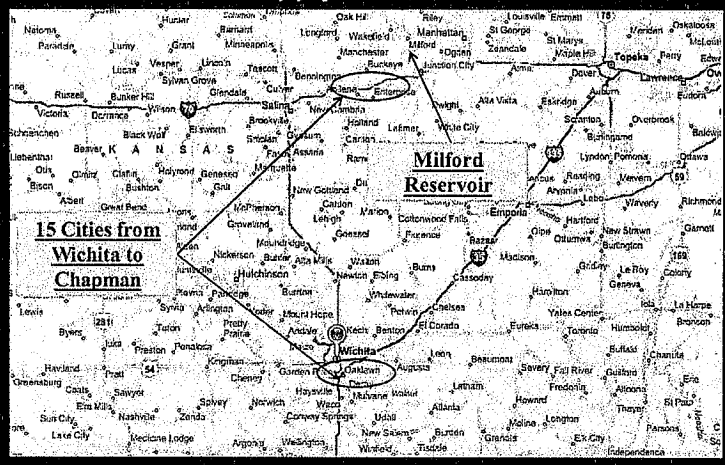
H-2


120
100
80
60
40
20
0
Water Supply/Water Demand (MGD)
2010
2015
2020
2025
2030
2035
2040
2045
2050
Year
Bentley Wellfield - 2.6 MGD
Local Wellfield - 7 MGD
Total Supply 92.3 MGD
Average Day Demands
Average Day Demands with Additional Conservation
Equus Beds Wellfield 35.7 MGD
Cheney Reservoir 47 MGD


Alternate Sources of Water
Water Supply Plan evaluated 27 different water supply sources.
Plan included review of obtaining water from Milford Reservoir.
Potential use of Milford Reservoir ignited significant opposition from NE Kansas.

Milford Alternative

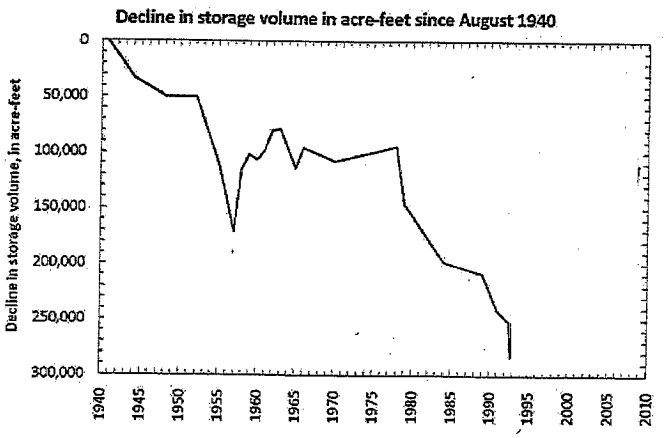
- Wholesale Public Water Supply District 10
- Selected Water Supply was Milford Reservoir

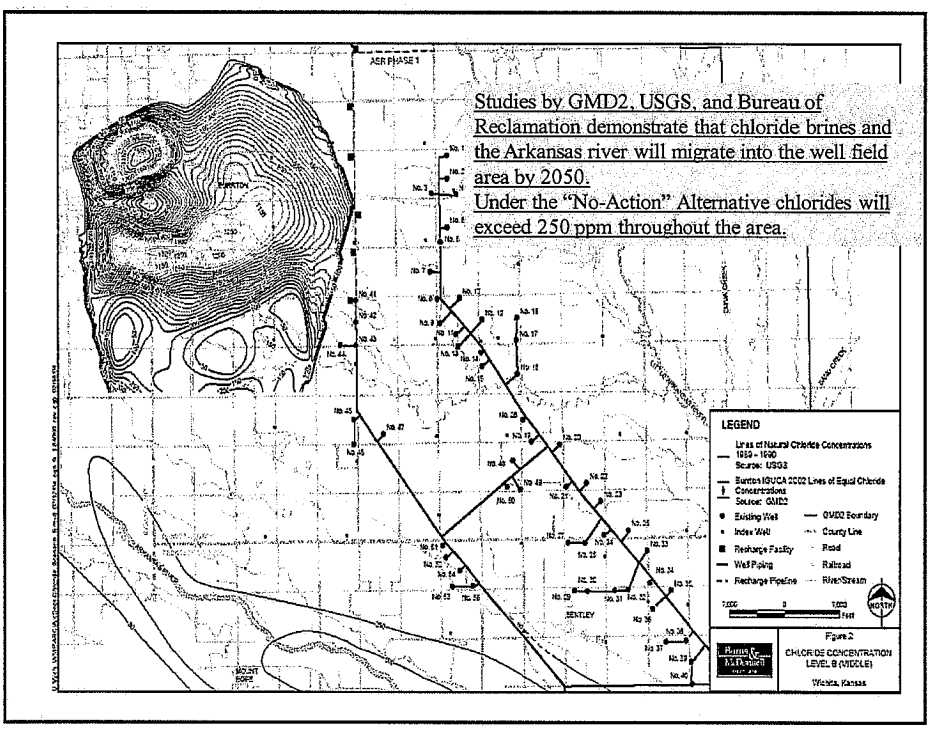


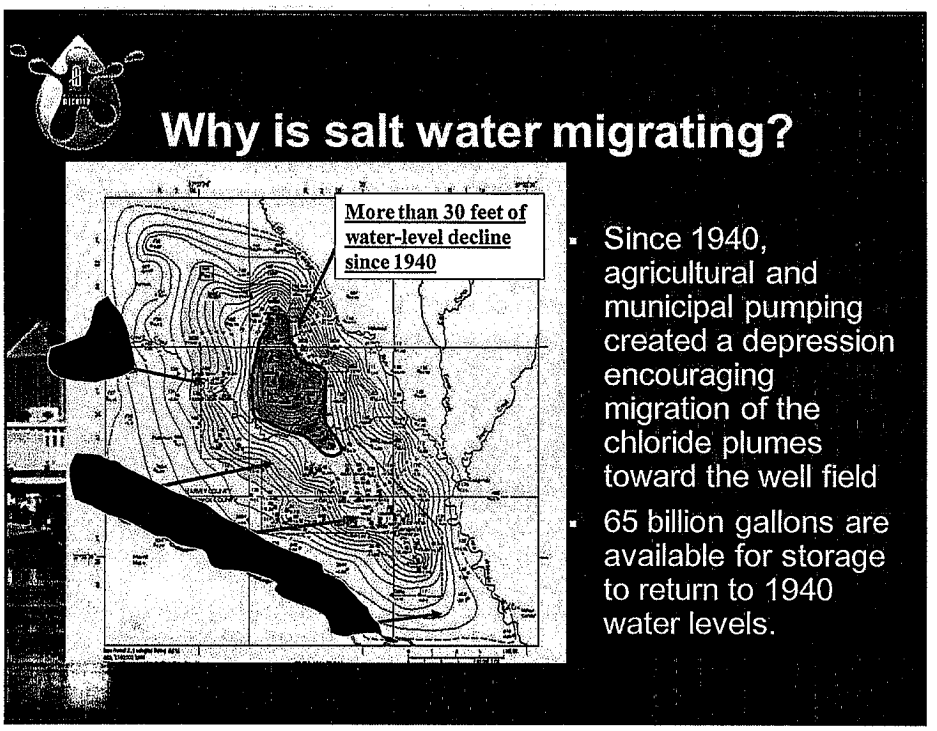
Equus Beds Aquifer is a major source of water supply for the City of Wichita, but also a major source of water for agricultural and industrial use.

Equus Beds Aquifer

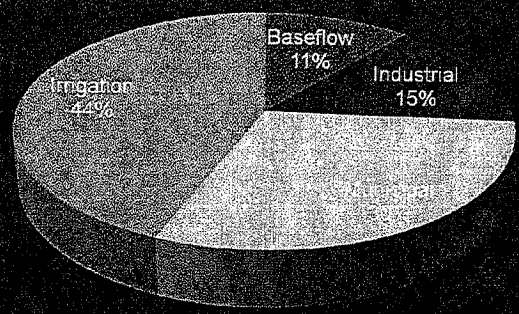
- Is a renewable water resource, but water use has exceeded natural recharge.
- Excess use of the aquifer through the early 90's had resulted in water level declines of up to 40 feet, and increased the risk of salt water contamination




ASR PHASE 1
Studies by GMD2, USGS, and Bureau of Reclamation demonstrate that chloride brines and the Arkansas river will migrate into the well field area by 2050.
Under the "No-Action" Alternative chlorides will exceed 250 ppm throughout the area.
LEGEND
Lines of Natural Chloride Concentrations 1959 - 1990 Source: USGS
Burton/HUCA 2002 Lines of Equal Chloride Concentrations Source: GMD2
Existing Well
Index Well
Recharge Facility
Well Piping
Recharge Pipeline
GMD2 Boundary
County Line
Road
Railroad
River/Stream
NORTH
Figure 2
CHLORIDE CONCENTRATION LEVEL B (MIDDLE)
Wichita, Kansas


Why is salt water migrating?
More than 30 feet of water-level decline since 1940
Since 1940, agricultural and municipal pumping created a depression encouraging migration of the chloride plumes toward the well field
65 billion gallons are available for storage to return to 1940 water levels.

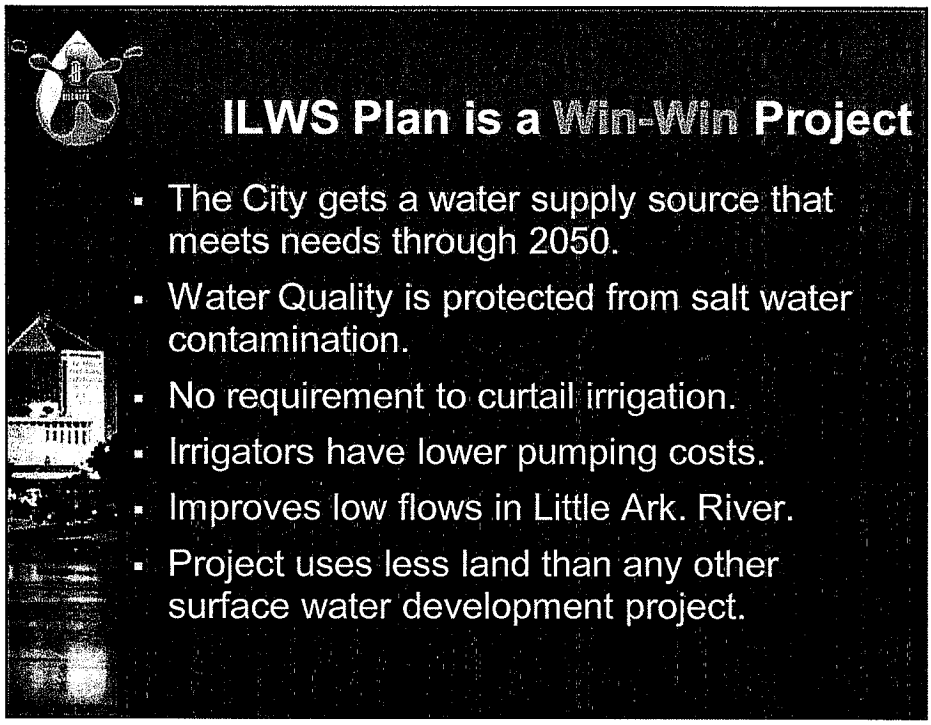
Equus Beds Aquifer

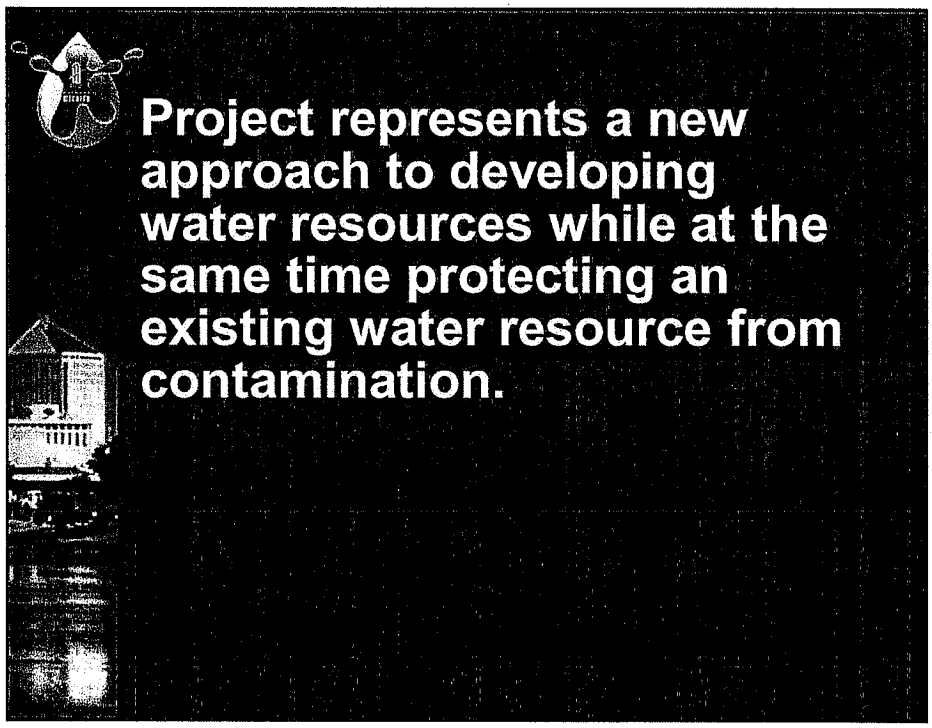


- 1,400 square miles
- 4 Counties
- 2,000 Non-Domestic Water Wells
- 157,000 acre-feet Withdrawn Annually

Integrated Local Water Supply Plan (ILWS Plan)

- **Greater use of Cheney Reservoir.**
- **Conservation.**
- **Build a 100 MGD Aquifer Storage and Recovery (ASR) system.**
- **Re-develop the Bentley Reserve WF - 10 MGD.**
- **Expand Local Well Field - 45 MGD.**
- **Install additional raw water pipelines.**
- **Add a new water treatment plant - 65 MGD.**

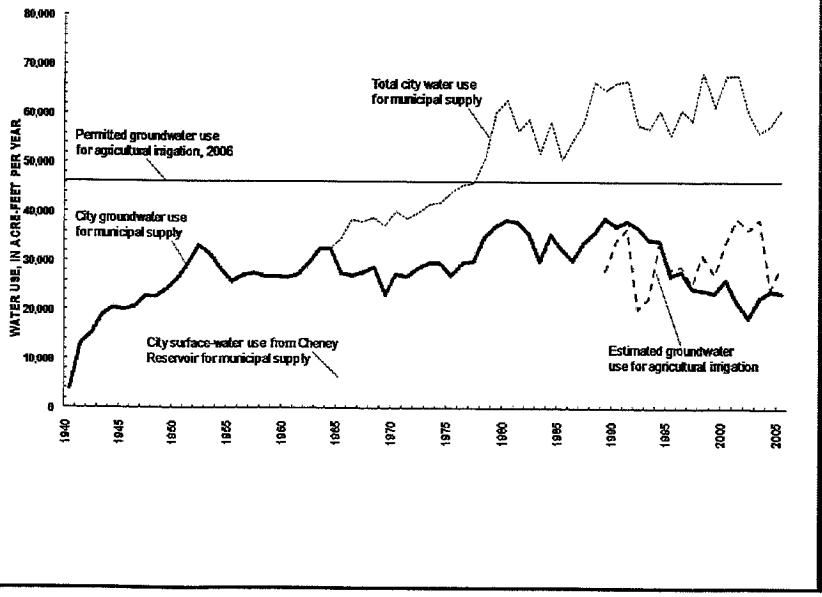

ILWS Plan is a Win-Win Project
The City gets a water supply source that meets needs through 2050.
Water Quality is protected from salt water contamination.
No requirement to curtail irrigation.
Irrigators have lower pumping costs.
Improves low flows in Little Ark. River.
Project uses less land than any other surface water development project.

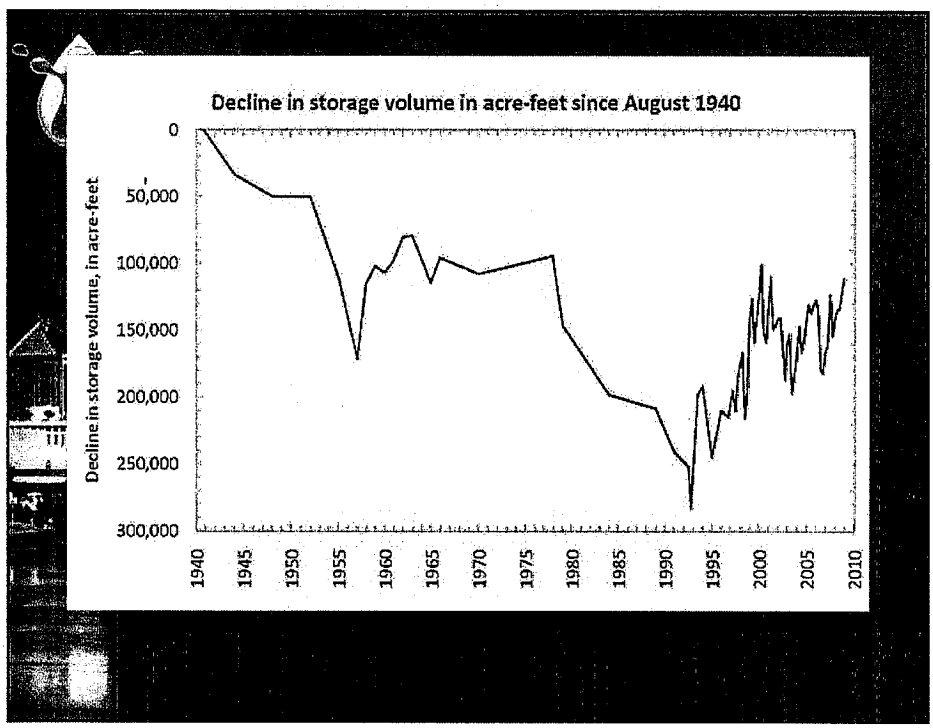

Project represents a new approach to developing water resources while at the same time protecting an existing water resource from contamination.

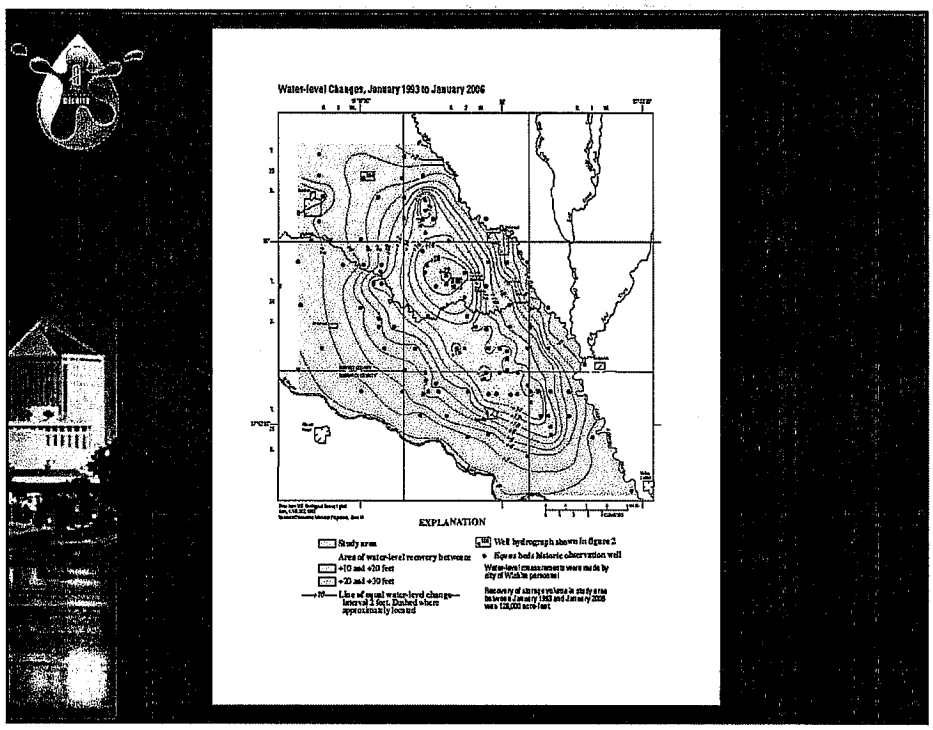
Impacts of ILWS Plan

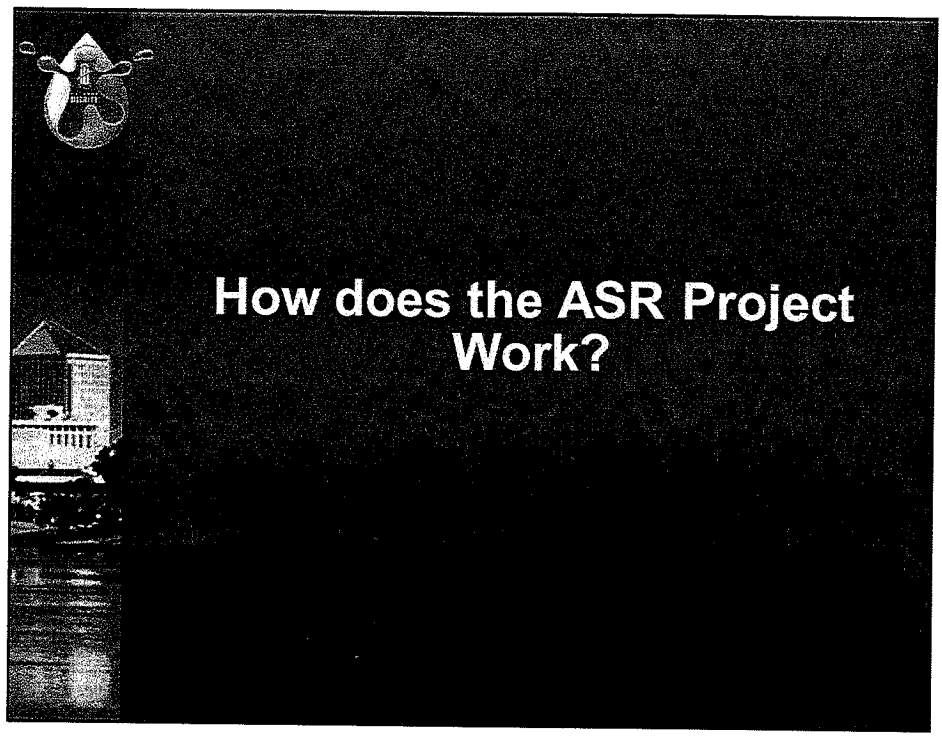
- In 1993 City began using more water from Cheney and surface related sources and less from Equus Beds.
- In 1993 new "conservation" water rate structure implemented.

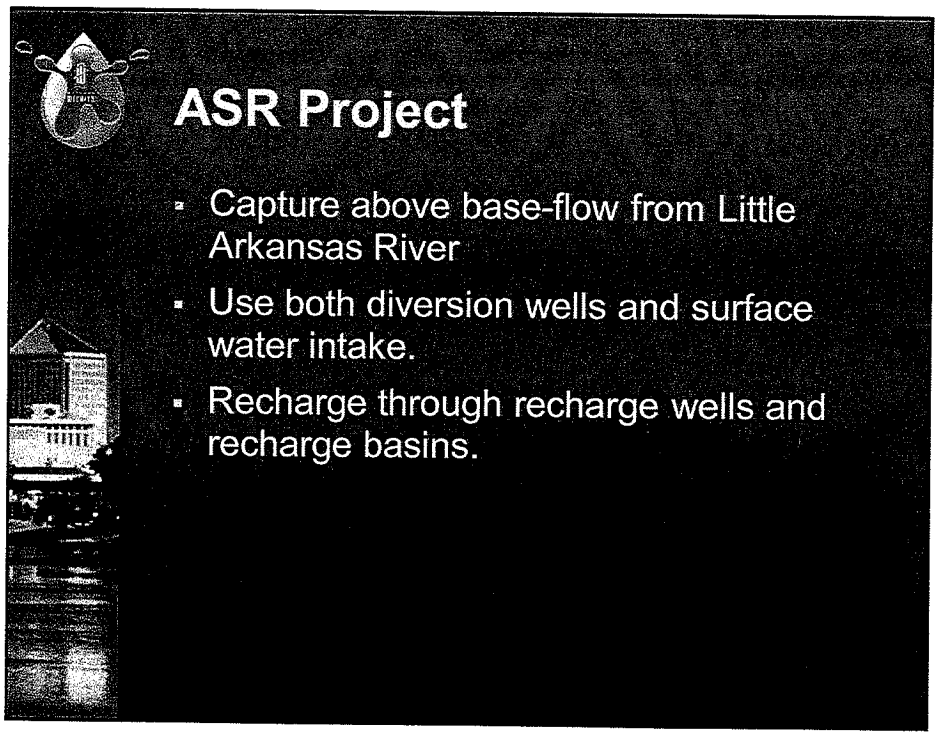
Water Use 1940-2005




Decline in storage volume in acre-feet since August 1940
Decline in storage volume, in acre-feet
0
50,000
100,000
150,000
200,000
250,000
300,000
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010


Water-level Changes, January 1993 to January 2006
EXPLANATION
Study area
Area of water-level recovery between
+10 and +20 feet
+20 and +30 feet
Line of equal water-level change—Interval 5 feet. Dashed where approximately located
Well hydrograph shown in figure 2
Recovery of storage volume in study area between 1 January 1993 and January 2006 was 128,000 acre-feet


How does the ASR Project Work?

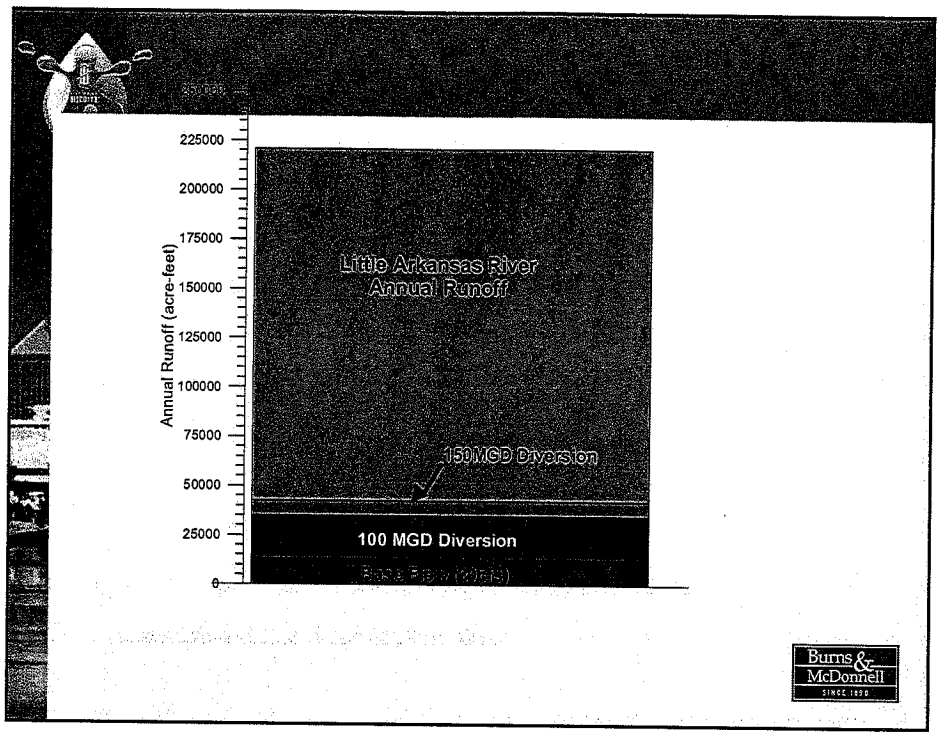

ASR Project
Capture above base-flow from Little Arkansas River
Use both diversion wells and surface water intake.
Recharge through recharge wells and recharge basins.

Aquifer Recharge Concepts

Recharge water is from Little Arkansas River using "above-base flow" water

- River flow above the "base flow" set by the State
- About 150,000 acre-feet of above-base flow water per year
- Generally good water quality

4-12



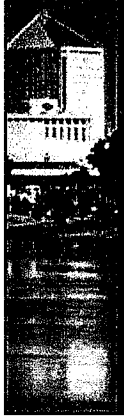
ASR Phase I

- 3 River Diversion Wells.
- One 7 MGD River Diversion.
- One 7 MGD Surface Water Treatment Plant (Ballasted Flocculation).
- 4 Recharge Wells.
- 2 Recharge Basins.
- 14 Miles of Overhead Power Lines

4-13

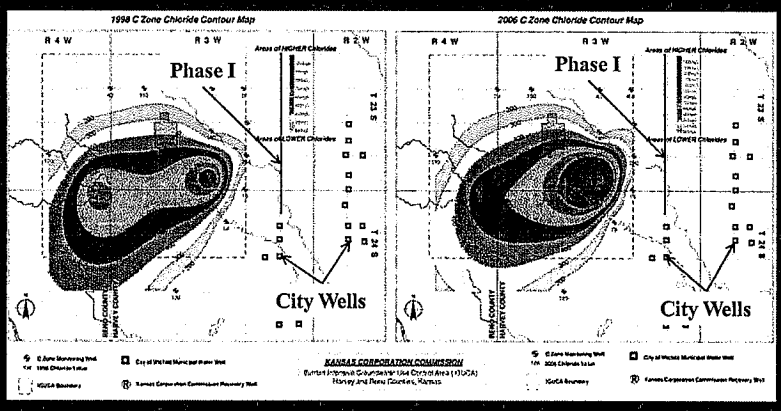
ASR Phase I

Targeted Recharge to build hydraulic barrier to halt salt water migration.

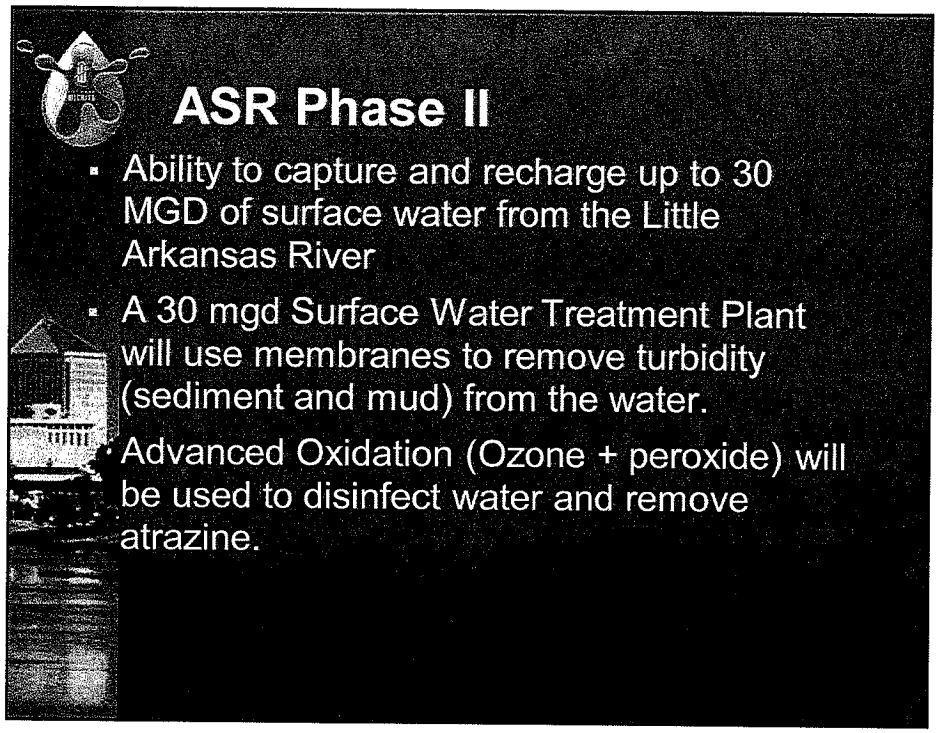


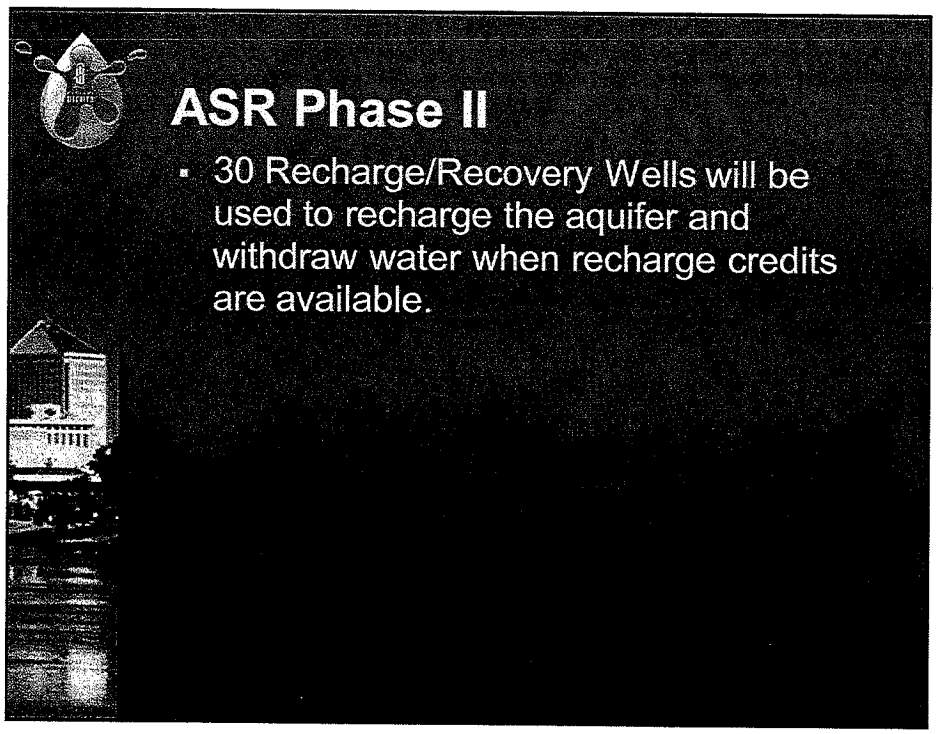
ASR Phase I

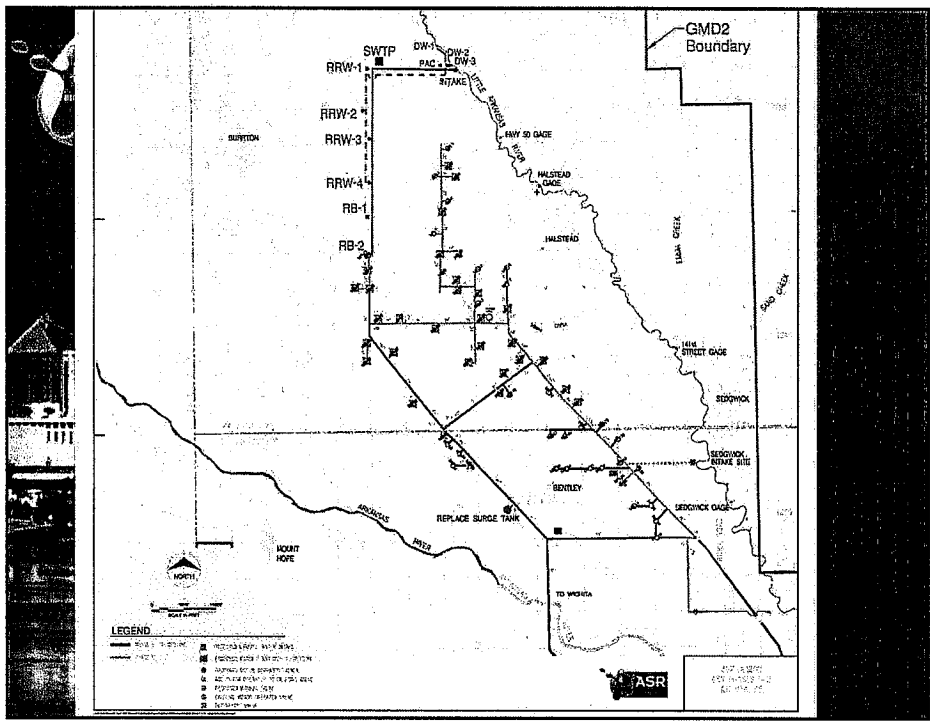
- Location selected to prevent migration of chlorides into the Equus Beds
- Constructed to establish a hydraulic barrier

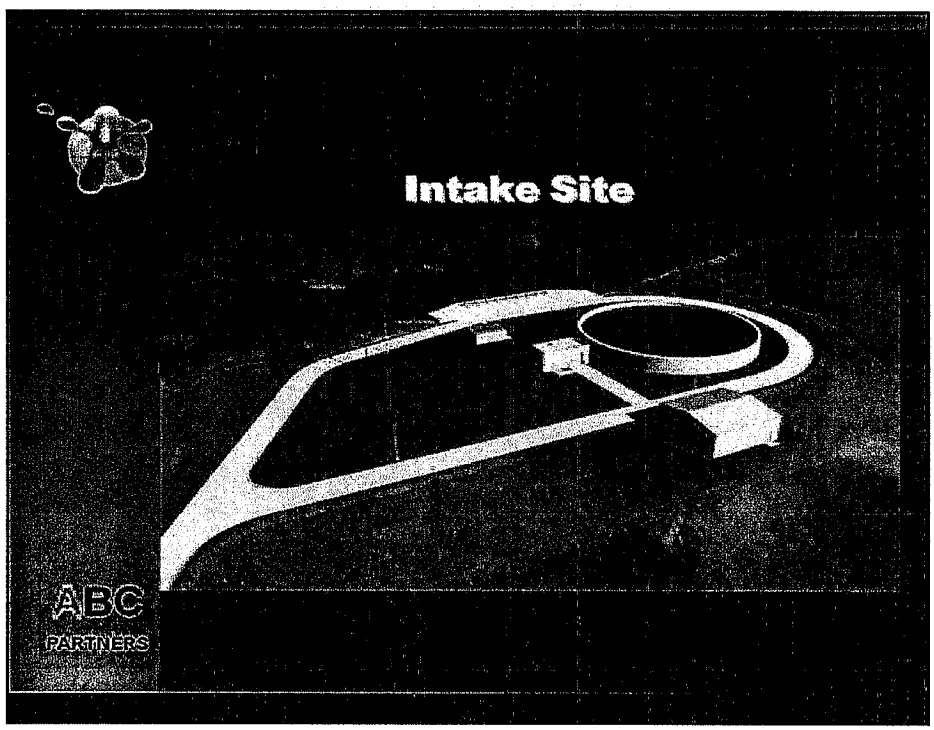


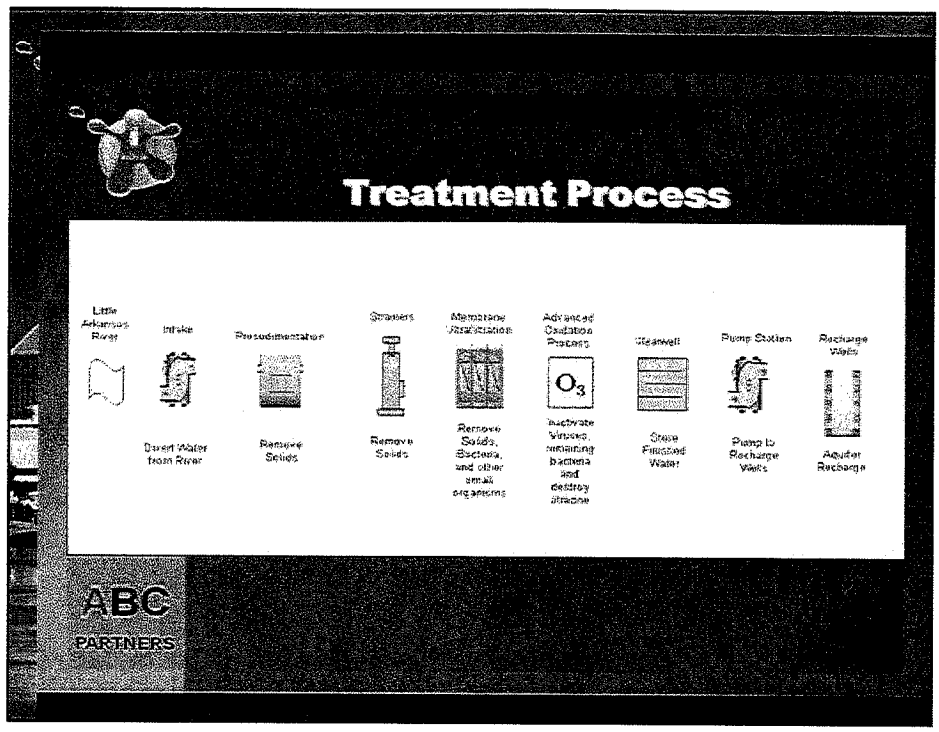
4.14

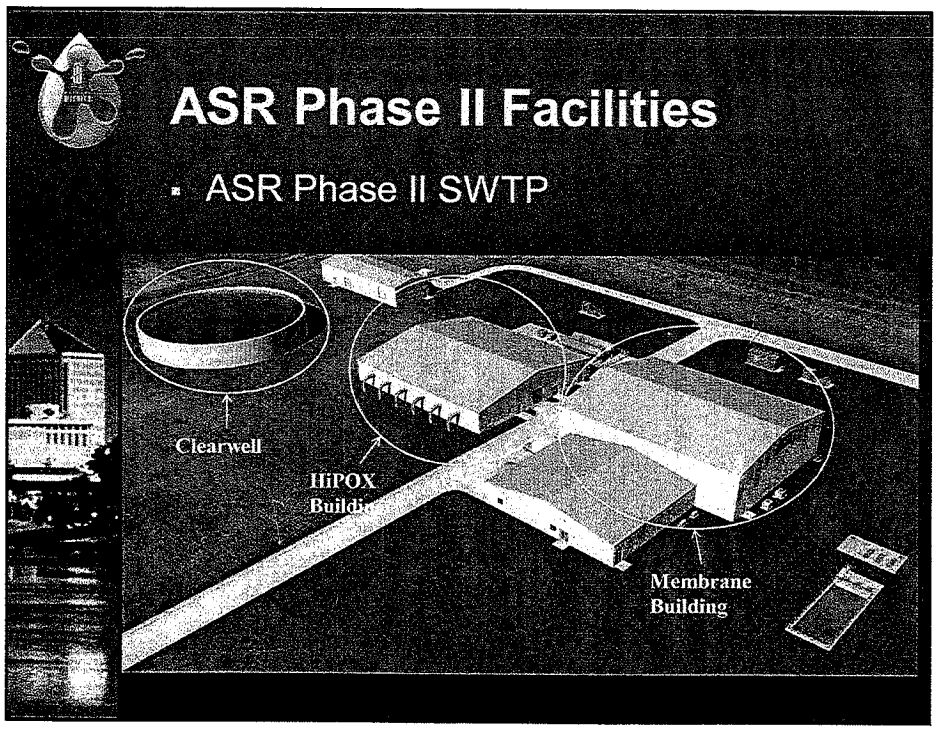

ASR Phase II
Ability to capture and recharge up to 30 MGD of surface water from the Little Arkansas River
A 30 mgd Surface Water Treatment Plant will use membranes to remove turbidity (sediment and mud) from the water.
Advanced Oxidation (Ozone + peroxide) will be used to disinfect water and remove atrazine.


ASR Phase II
30 Recharge/Recovery Wells will be used to recharge the aquifer and withdraw water when recharge credits are available.


GMD2
Boundary
SWTP
DW-1
DW-2
DW-3
PAC
INTAKE
RRW-1
RRW-2
RRW-3
RRW-4
RB-1
RB-2
BURRTON
HALSTEAD
HALSTEAD GAGE
HWY 50 GAGE
LITTLE ARKANSAS RIVER
LUSK CREEK
SAND CREEK
141st STREET GAGE
SEDGWICK
SEDGWICK INTAKE SITE
SEDGWICK GAGE
BENTLEY
REPLACE SURGE TANK
ARKANSAS RIVER
MOUNT HOPE
NORTH
TO WICHITA
LEGEND
ASR

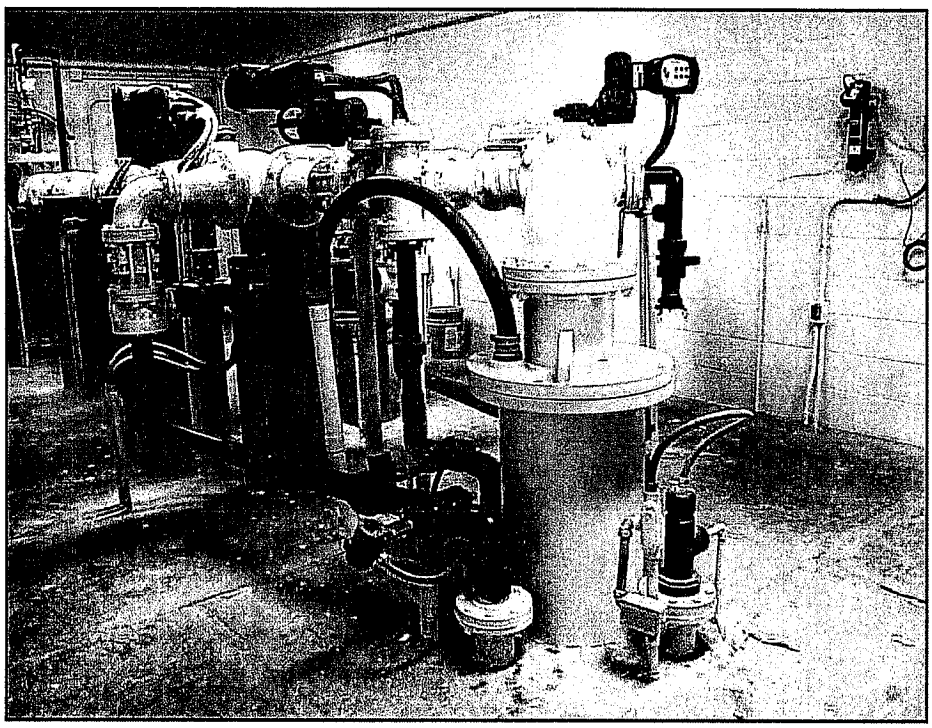

Intake Site
ABC
PARTNERS

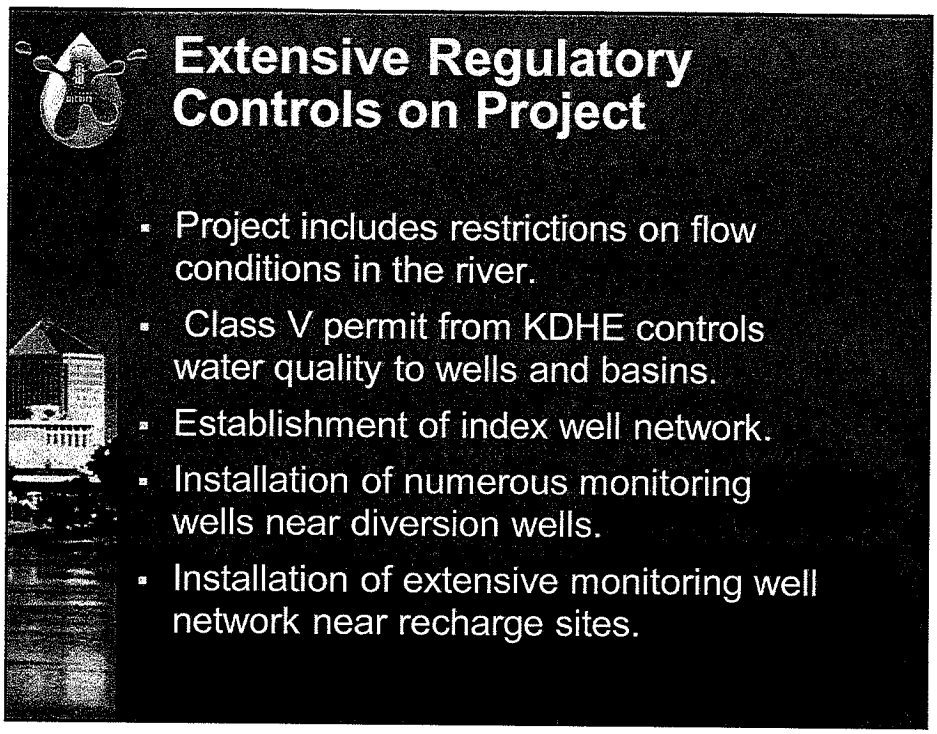

Treatment Process
Little Arkansas River
Intake
Divert Water from River
Presedimentation
Remove Solids
Strainers
Remove Solids
Membrane Filtration
Remove Solids, Bacteria, and other small organisms
Advanced Oxidation Process
O_3
Inactivate Viruses, remaining bacteria and destroy ozone
Clearwell
Store Finished Water
Pump Station
Pump to Recharge Wells
Recharge Wells
Aquifer Recharge
ABC
PARTNERS

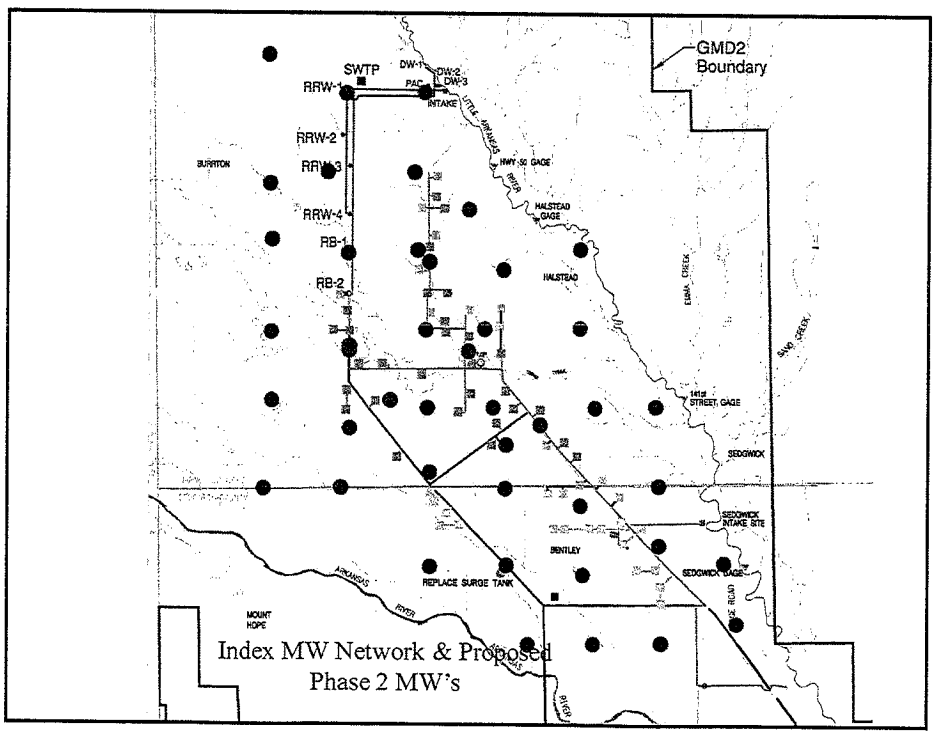

ASR Phase II Facilities
ASR Phase II SWTP
Clearwell
HiPOX Building
Membrane Building

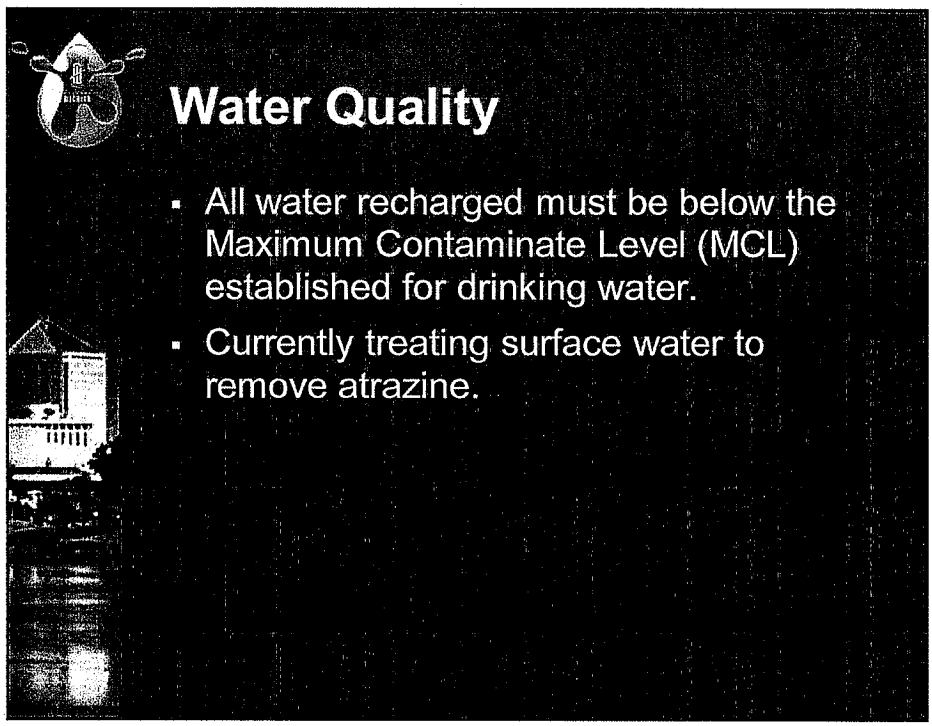
ASR Phase II Facilities

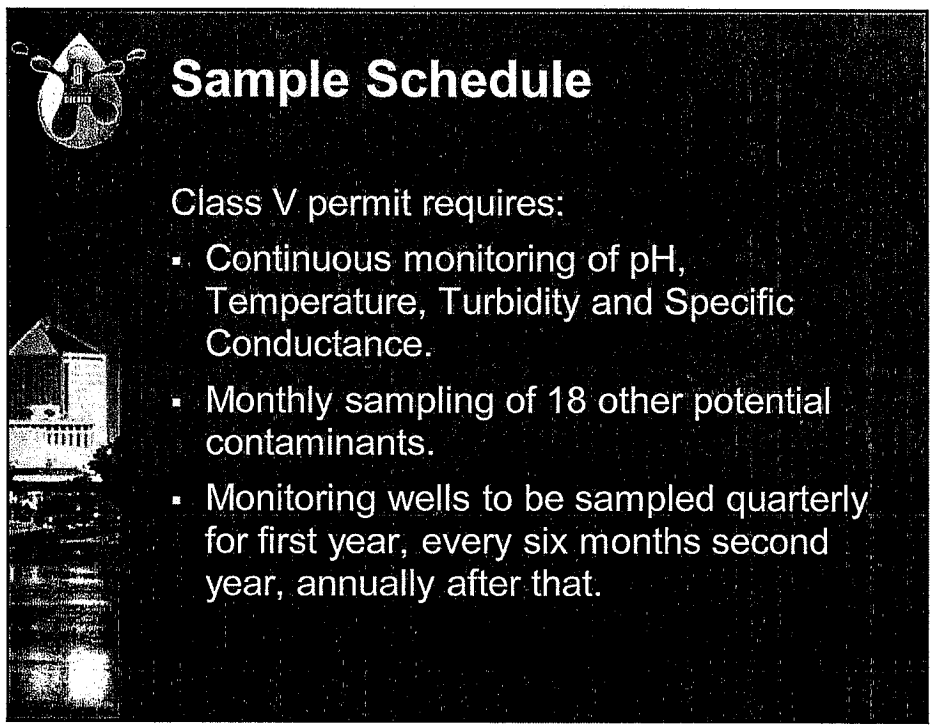
- Construction at ASR Phase II SWTP




Extensive Regulatory Controls on Project
Project includes restrictions on flow conditions in the river.
Class V permit from KDHE controls water quality to wells and basins.
Establishment of index well network.
Installation of numerous monitoring wells near diversion wells.
Installation of extensive monitoring well network near recharge sites.


GMD2 Boundary
SWTP
RRW-1
RRW-2
RRW-3
RRW-4
RB-1
RB-2
DW-1
DW-2
DW-3
INTAKE
BURRTON
HALSTEAD
HALSTEAD GAGE
HWY 50 GAGE
SEDGWICK
SEDGWICK INTAKE SITE
SEDGWICK GAGE
BENTLEY
REPLACE SURGE TANK
MOUNT HOPE
Index MW Network & Proposed Phase 2 MW's


Water Quality
All water recharged must be below the Maximum Contaminate Level (MCL) established for drinking water.
Currently treating surface water to remove atrazine.


Sample Schedule
Class V permit requires:
Continuous monitoring of pH, Temperature, Turbidity and Specific Conductance.
Monthly sampling of 18 other potential contaminants.
Monitoring wells to be sampled quarterly for first year, every six months second year, annually after that.

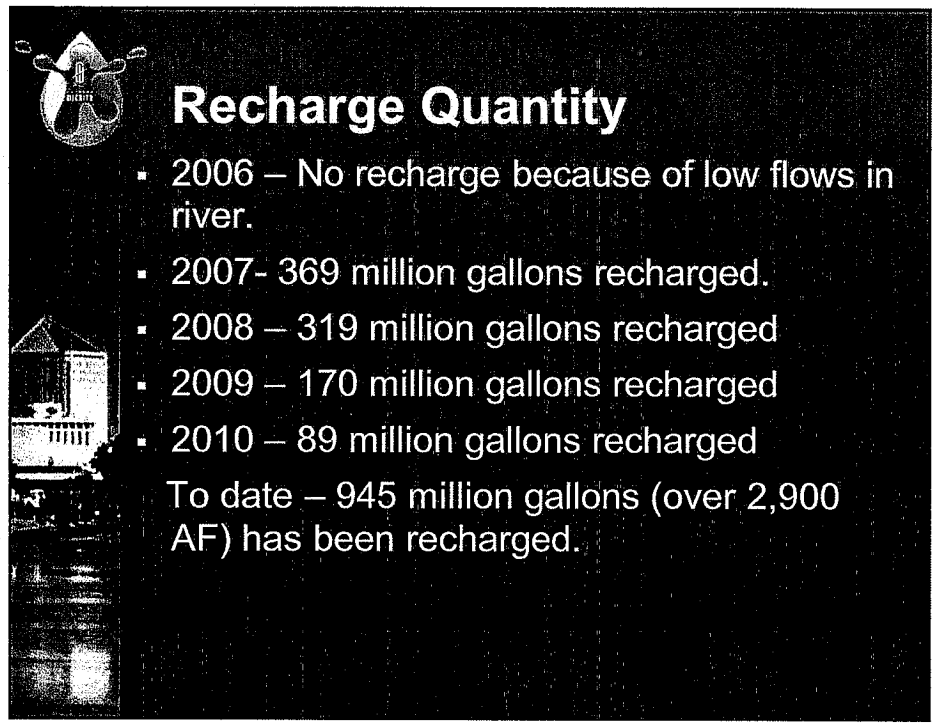
4.20

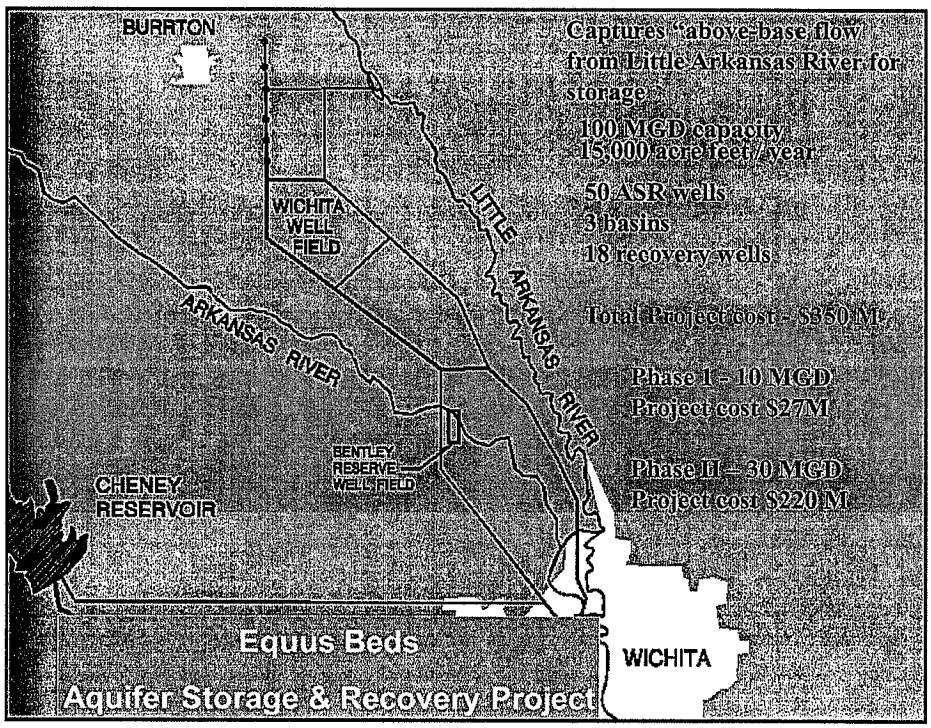
Water Quality

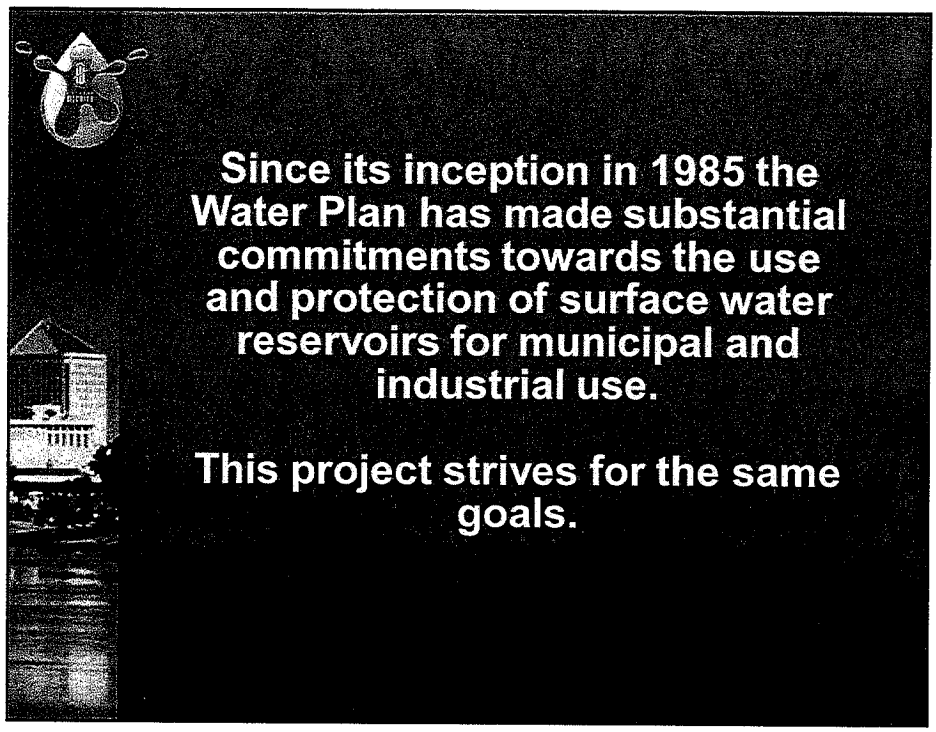
	Recharge Wells	Recharge Basins	Drinking Water Stan.
Atrazine	N/D	1.6 ppb	3 ppb
Arsenic	8.6 ppb	N/D	10 ppb
Hardness	135 ppm	123 ppm	NA
Chlorides	5.5 ppm	42.8 ppm	250 ppm
Nitrates	N/D	0.3 ppm	10 ppm

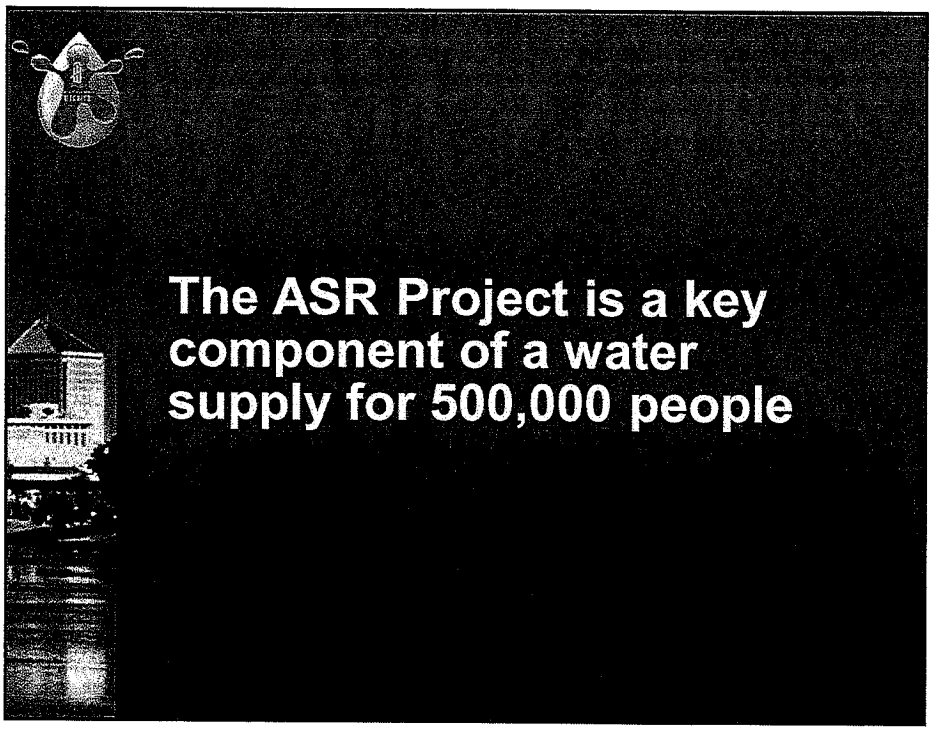
Sample Requirements

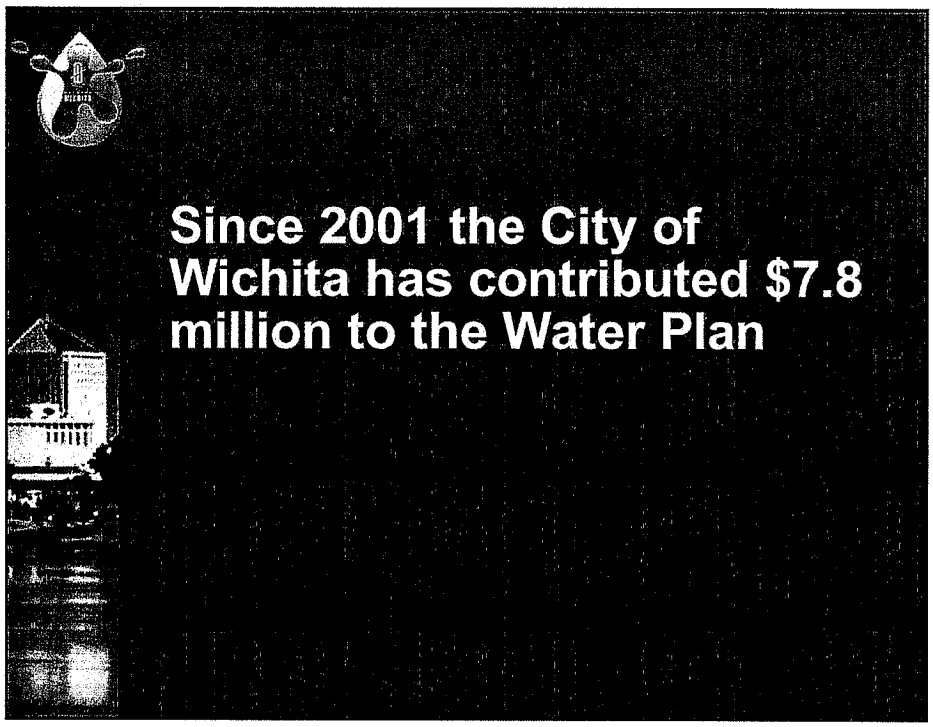
- Required to analyze samples for up to 259 potential contaminates.
- Voluntary domestic well sampling program

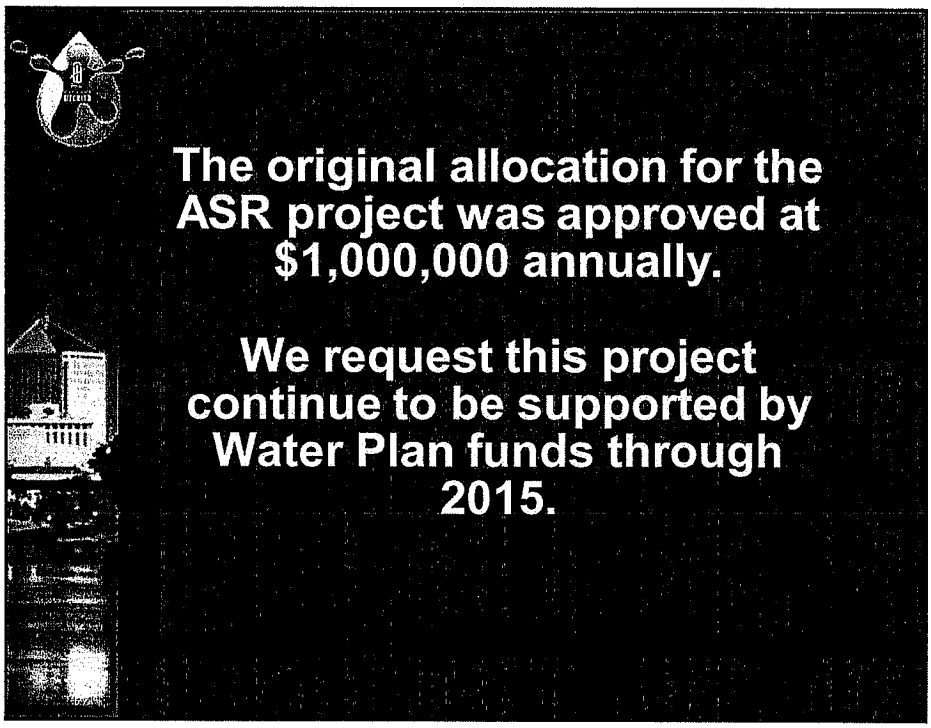

Recharge Quantity
2006 – No recharge because of low flows in river.
2007- 369 million gallons recharged.
2008 – 319 million gallons recharged
2009 – 170 million gallons recharged
2010 – 89 million gallons recharged
To date – 945 million gallons (over 2,900 AF) has been recharged.


BURRTON
WICHITA WELL FIELD
LITTLE ARKANSAS RIVER
ARKANSAS RIVER
BENTLEY RESERVE WELL FIELD
CHENEY RESERVOIR
WICHITA
Captures "above-base flow" from Little Arkansas River for storage
100 MGD capacity
15,000 acre-feet/year
50 ASR wells
3 basins
18 recovery wells
Total Project cost - $350 M
Phase I - 10 MGD
Project cost $27M
Phase II – 30 MGD
Project cost $220 M
Equus Beds
Aquifer Storage & Recovery Project

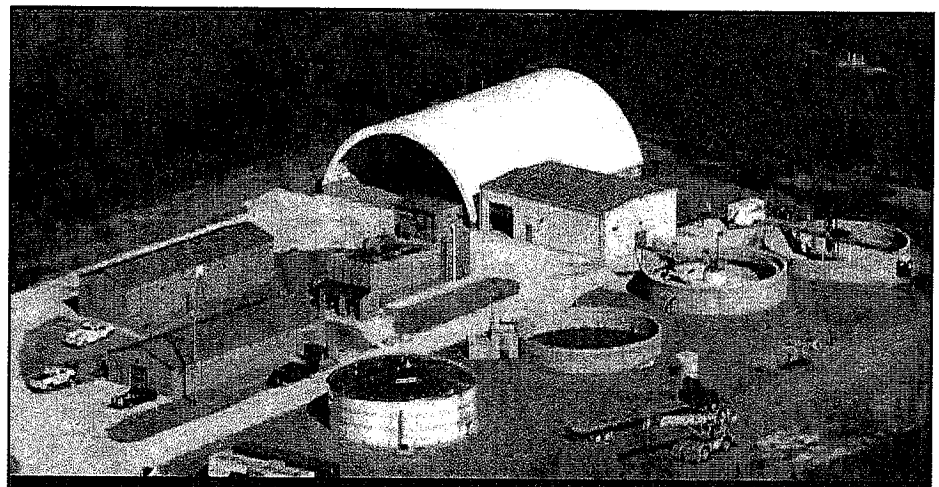

Since its inception in 1985 the Water Plan has made substantial commitments towards the use and protection of surface water reservoirs for municipal and industrial use.
This project strives for the same goals.


The ASR Project is a key component of a water supply for 500,000 people


Since 2001 the City of Wichita has contributed $7.8 million to the Water Plan


The original allocation for the ASR project was approved at $1,000,000 annually.
We request this project continue to be supported by Water Plan funds through 2015.

4-24

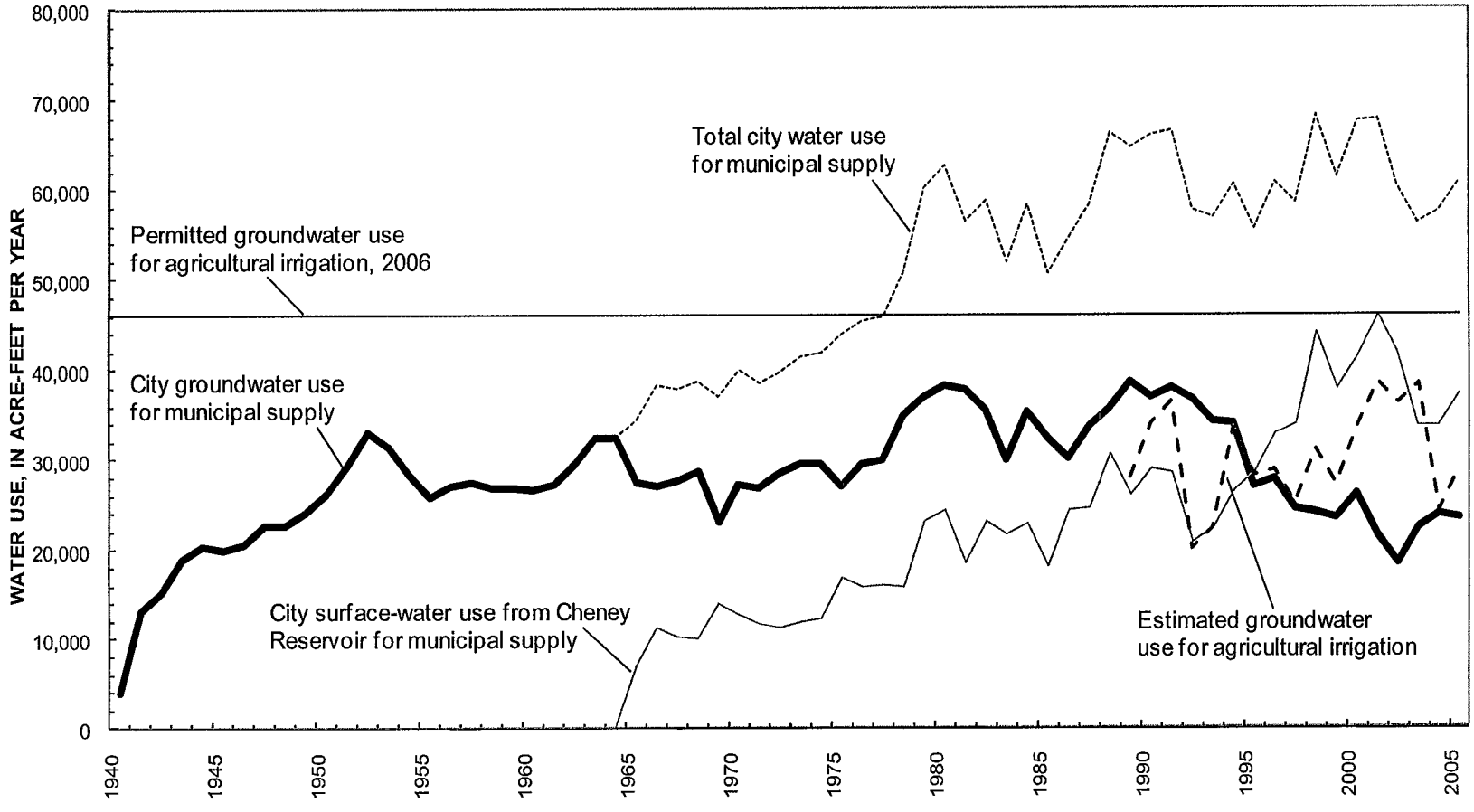


Questions?

CITY OF WICHITA

R·W BECK
An SAIC Company

Water Use 1940-2005

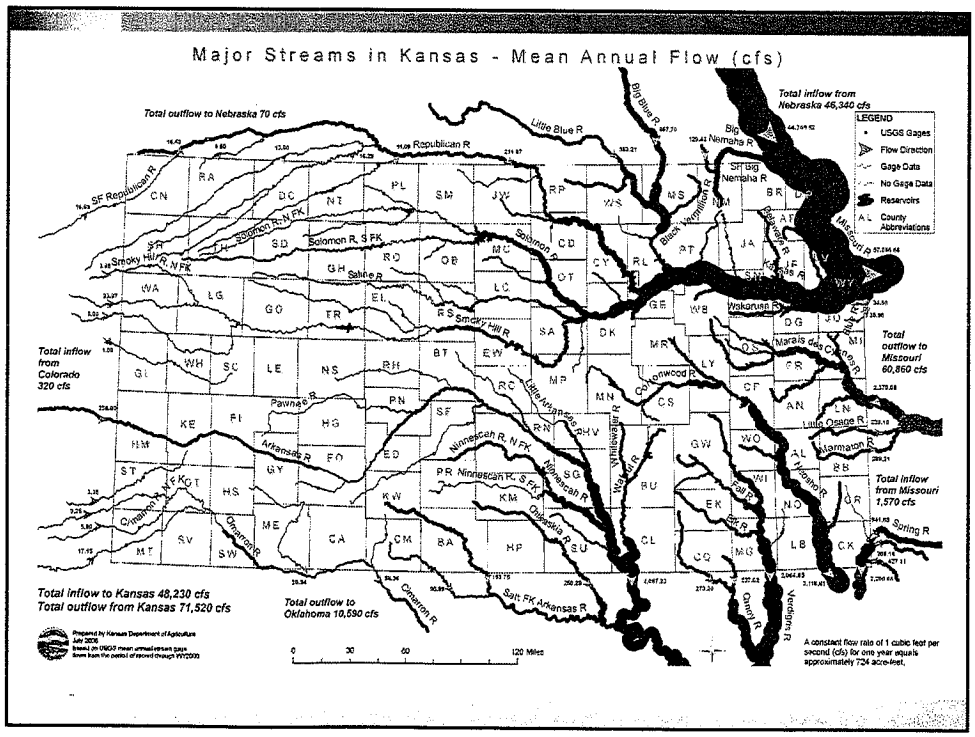


JOINT COMMITTEE ON ENERGY AND ENVIRONMENTAL POLICY
DATE: 10/7/10
ATTACHMENT 5

Kansas Water Office

Surface Water and Reservoir Status and Availability

Earl Lewis
Kansas Water Office
October 7, 2010



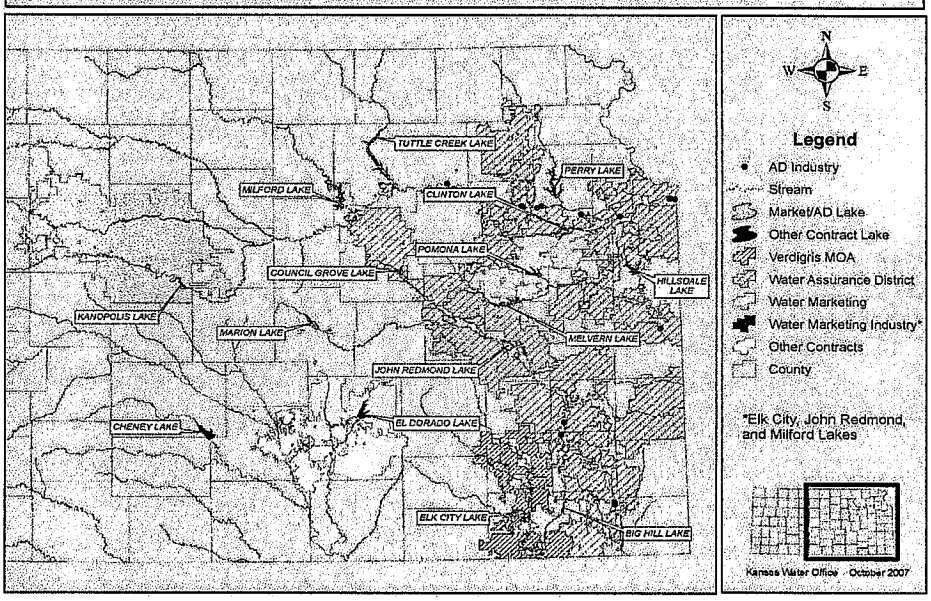
JOINT COMMITTEE ON ENERGY AND ENVIRONMENTAL POLICY
DATE: 10/7/10
ATTACHMENT 6

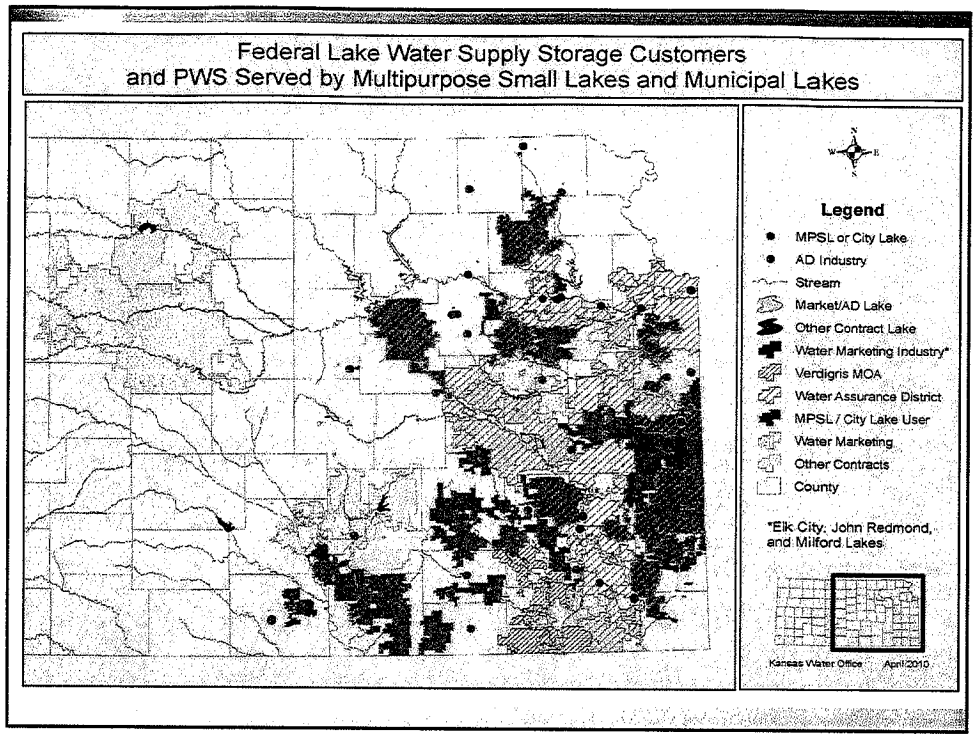
Kansas Water Office

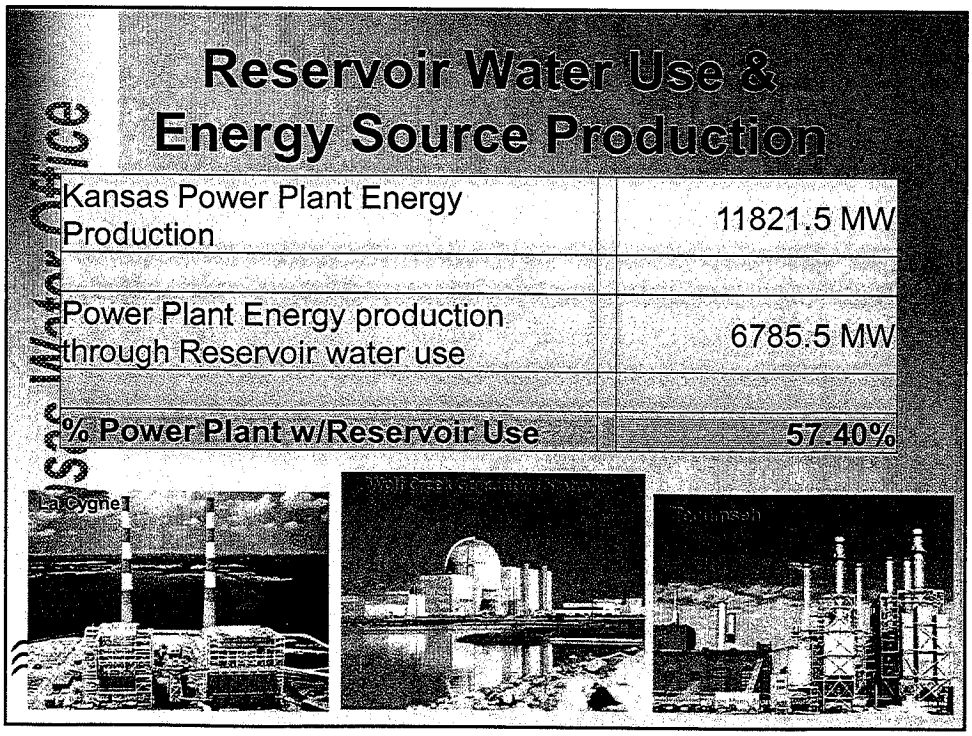
Surface Water Supply in Kansas

- State owned storage in Corps of Engineers lakes
- Kansas Water Office operates two programs from state owned storage
- Wichita and El Dorado own storage
- Serve 2/3 of the Kansas population with water supply

Federal Lake Water Supply Storage Customers




Federal Lake Water Supply Storage Customers
and PWS Served by Multipurpose Small Lakes and Municipal Lakes
Legend
MPSL or City Lake
AD Industry
Stream
Market/AD Lake
Other Contract Lake
Water Marketing Industry*
Verdigris MOA
Water Assurance District
MPSL / City Lake User
Water Marketing
Other Contracts
County
*Elk City, John Redmond, and Milford Lakes
Kansas Water Office
April 2010


Reservoir Water Use &
Energy Source Production
Kansas Water Office
Kansas Power Plant Energy Production
11821.5 MW
Power Plant Energy production through Reservoir water use
6785.5 MW
% Power Plant w/Reservoir Use
57.40%
LaCygne1
Tecumseh

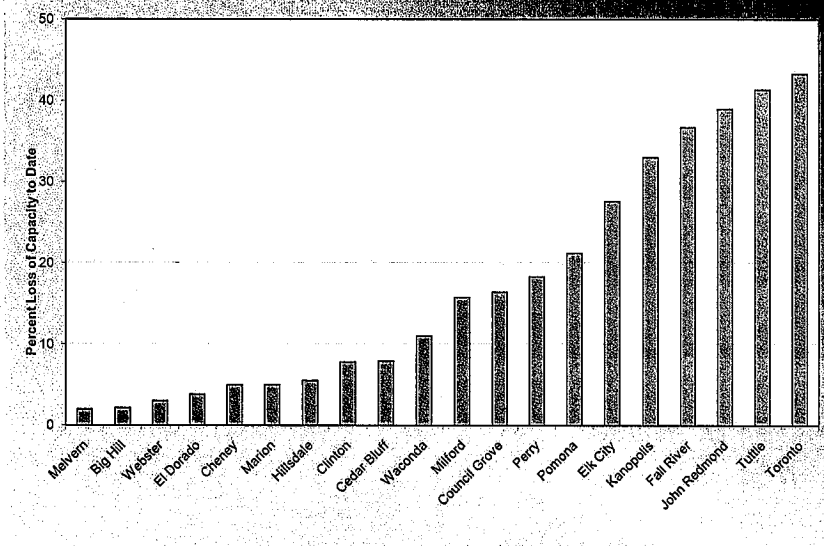
Kansas Water Office

Water Marketing/Water Assurance Programs

- Two separate programs make use of storage in federal reservoirs
  - Water Marketing Program
  - Water Assurance Program
- Both make use of conservation storage in the reservoirs
- Both are dedicated to meet municipal and industrial needs

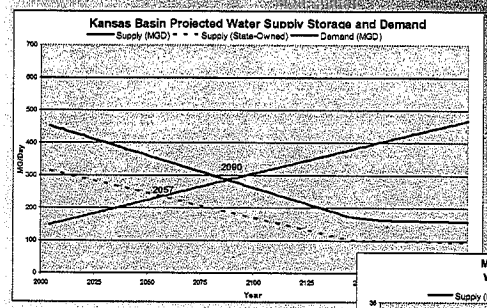
Kansas Water Office

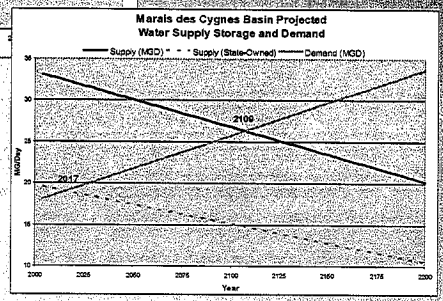
Sedimentation Impacting Supply



Kansas Water Office

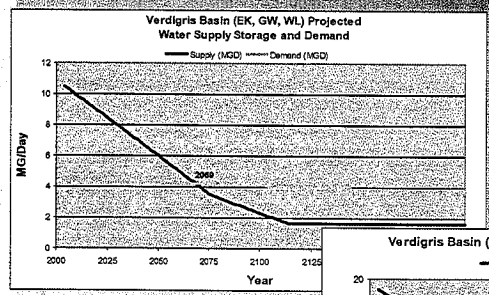
Kansas and Marais des Cygnes River Corridors Supply-Demand

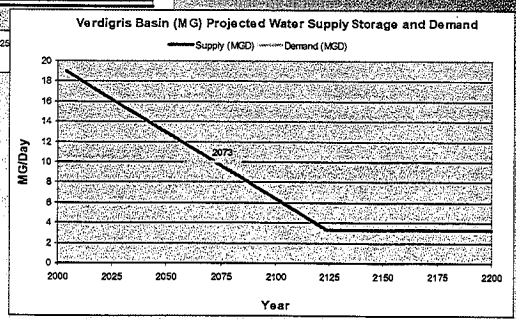




Kansas Water Office

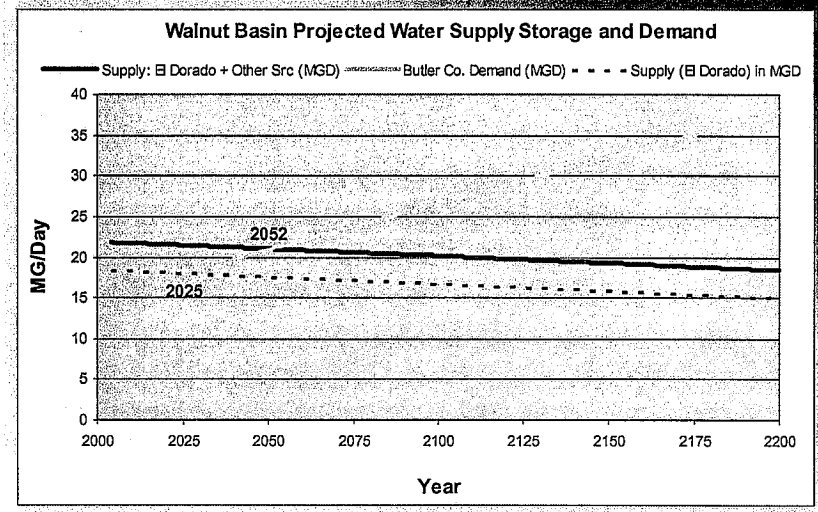
Verdigris Corridor Supply-Demand





Kansas Water Office

Walnut Corridor (BU County) Supply-Demand

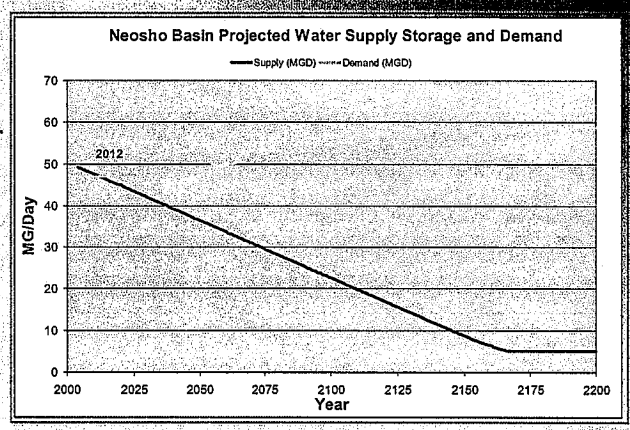


Kansas Water Office

Water Supply and Demand

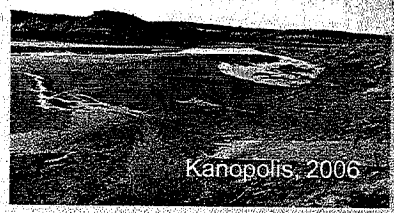
Initial assessment identified Neosho as the highest priority.

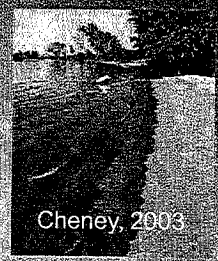
OASIS Computer Model simulations refine projections.

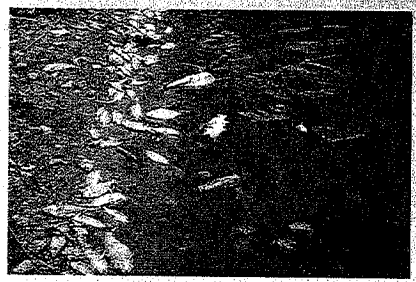


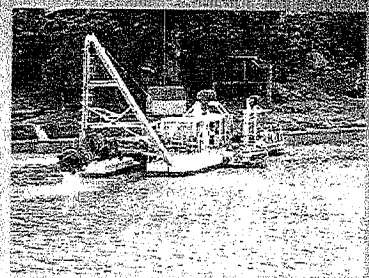
Kansas Water Office

Sedimentation-related problems occur in nearly ever reservoir in the state


Kanopolis, 2006


Cheney, 2003





Kansas Water Office

Reservoir Sedimentation What We Know

- Majority of sediment delivered during high flow events
- Traditional land surface BMPs have limited ability to influence sediment delivery
- Stream banks are a significant source of sediment
- Stream restoration BMPs (e.g. streambank stabilization) require a systems approach to design & implementation
- Healthy wetland and forested riparian areas are highly effective for sediment reduction and watershed protection

Kansas Water Office

Reservoir Sustainability Initiative

Kansas Water Office

Statutory Recommendations

- The statutory issues require resolution if the state of Kansas is to ***secure, protect, and restore*** the state's reservoirs to meet the needs of the citizens in the 21st century.
- The recommendation is to create a comprehensive **Kansas Reservoir Sustainability Act** (RSA) with the following goal:
  - *The State of Kansas will have the authority to secure, protect and restore reservoir storage needed to meet the water supply needs of the citizens of Kansas.*

Kansas Water Office

Statutory Recommendations
Secure

- State statute requires a commitment on the part of a user to bring the water into service and begin paying for it before the state enters into repayment agreements to the federal government. To secure additional storage in existing reservoirs for future use, this requirement may need to be removed.

Kansas Water Office

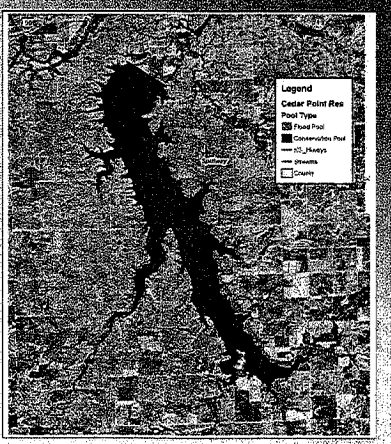
Statutory Recommendations
Secure

New Reservoir Sites

•Establish authority for the state to initiate the development of water supply reservoirs and other means of storage

•Authority to protect reservoir and other storage sites for future water supply from development or other restrictive activities

•Authority for the state to identify sites in the best locations for future water storage



Kansas Water Office

Statutory Recommendations

Protect

Protect Investment

- Authority for the state to provide 100% funding for conservation project planning and implementation
- Dedicated Conservation Easement Fund
- Remove statutory requirement for federal funding

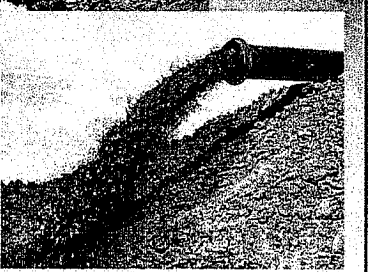
Kansas Water Office

Statutory Recommendations

Restore

Restore Impaired Storage

- Coordination of all aspects of a systematic dredging program for the purposes of water supply storage capacity restoration
- Establish a cost-share program to assist eligible dam owners in paying for needed dam rehabilitation and upgrade measures



Kansas Water Office

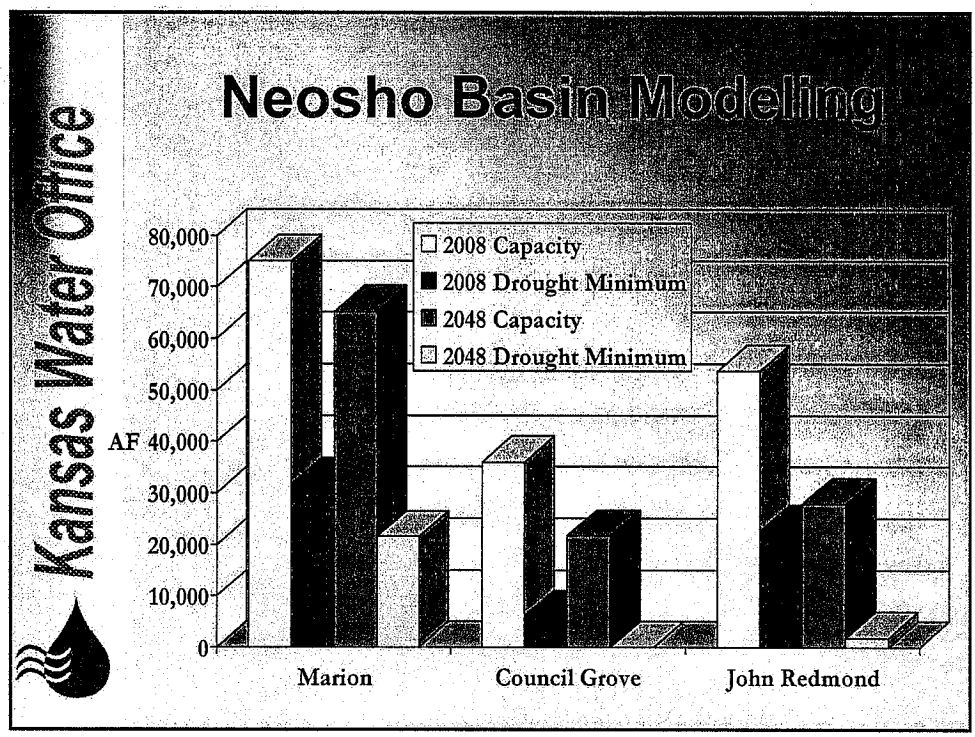
Reservoir Roadmap Financial Needs

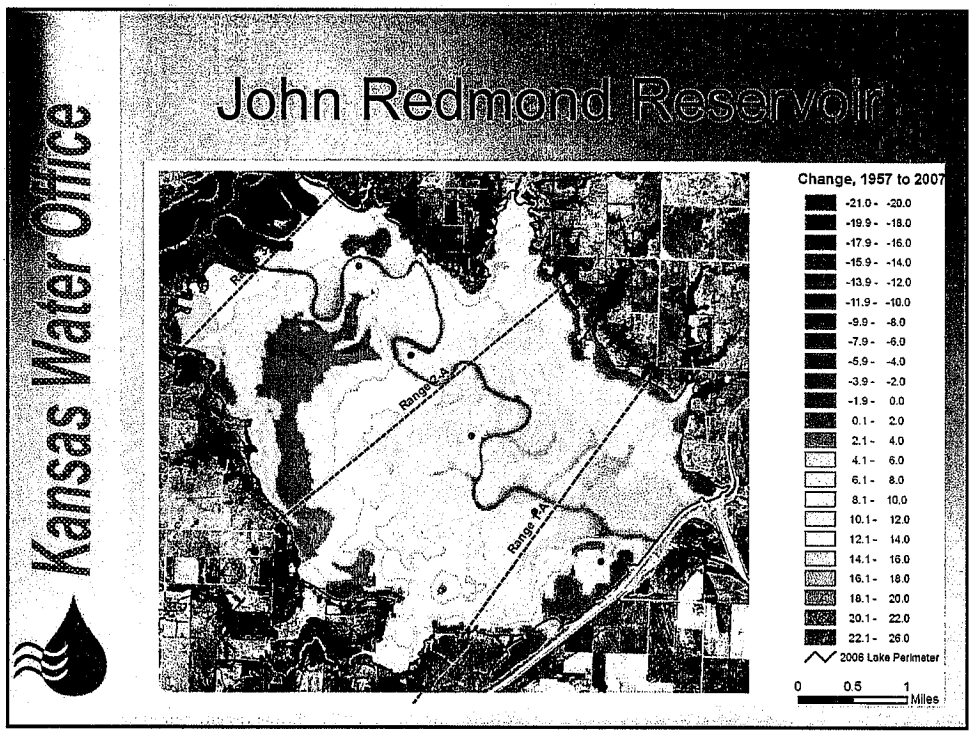
Reservoir Roadmap	10 Yr Total	20 Yr Total	40 Yr Total
Secure			
Reservoir Debt Service & Storage Purchase (P & I)	$ 16,000,000	$ 107,000,000	$ 263,000,000
Reservoir Operation and Maintenance	$ 21,000,000	$ 67,000,000	$ 247,000,000
Unfunded Liability	$ -	$ 19,000,000,000	$ 488,000,000
Purchase of Additional Federal Storage	$ 13,000,000	$ 35,000,000	$ 119,000,000
Development of New Large Reservoir	$ -	$ 300,000,000	$ 293,000,000
Development of New Small Reservoirs	$ 7,000,000	$ 26,000,000	$ 197,000,000
Minimum Pool Agreement	$ 400,000	$ 2,000,000	$ 5,000,000
Planning and Design	$ 3,000,000	$ 7,000,000	$ 12,000,000
Total Secure	**$ 60,400,000**	**$ 563,000,000**	**$ 2,149,000,000**
Protect			
Implementation of Best Management Practices	$ 19,000,000	$ 57,000,000	$ 189,000,000
Riparian and Wetland Protection and Development	$ 13,000,000	$ 33,000,000	$ 121,000,000
Riparian and Wetland Easments	$ 16,000,000	$ 57,000,000	$ 57,000,000
Streambank Stabilization	$ 32,000,000	$ 115,000,000	$ 115,000,000
Planning and Design	$ 36,000,000	$ 41,000,000	$ 51,000,000
Total Protect	**$ 116,000,000**	**$ 303,000,000**	**$ 533,000,000**
Restore			
Sediment Removal Small Reservoirs	$ 87,000,000	$ 163,000,000	$ 163,000,000
Sediment Removal Large Reservoirs	$ 180,000,000	$ 995,000,000	$ 995,000,000
Dam Safety/ Rehabilitation	$ 35,000,000	$ 44,000,000	$ 84,000,000
Planning and Design	$ 5,000,000	$ 6,000,000	$ 6,000,000
Total Restore	**$ 307,000,000**	**$ 1,208,000,000**	**$ 1,248,000,000**
Total Reservoir Sustainability	**$ 483,400,000**	**$ 2,074,000,000**	**$ 3,930,000,000**

Kansas Water Office

BASIN APPROACH TO RESERVOIR SUSTAINABILITY

Neosho basin served as the pilot basin to demonstrate a comprehensive approach to reservoir sustainability


Kansas Water Office
Neosho Basin Modeling
AF
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
2008 Capacity
2008 Drought Minimum
2048 Capacity
2048 Drought Minimum
Marion
Council Grove
John Redmond

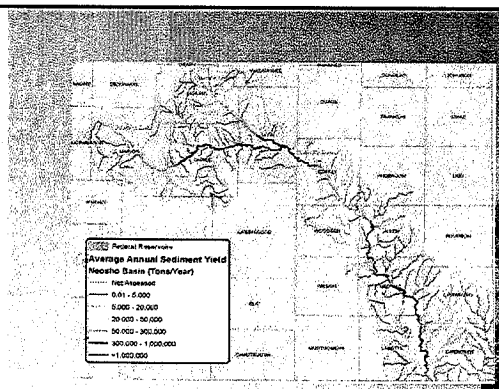

Kansas Water Office
John Redmond Reservoir
Change, 1957 to 2007
-21.0 - -20.0
-19.9 - -18.0
-17.9 - -16.0
-15.9 - -14.0
-13.9 - -12.0
-11.9 - -10.0
-9.9 - -8.0
-7.9 - -6.0
-5.9 - -4.0
-3.9 - -2.0
-1.9 - 0.0
0.1 - 2.0
2.1 - 4.0
4.1 - 6.0
6.1 - 8.0
8.1 - 10.0
10.1 - 12.0
12.1 - 14.0
14.1 - 16.0
16.1 - 18.0
18.1 - 20.0
20.1 - 22.0
22.1 - 26.0
2006 Lake Perimeter
0
0.5
1
Miles

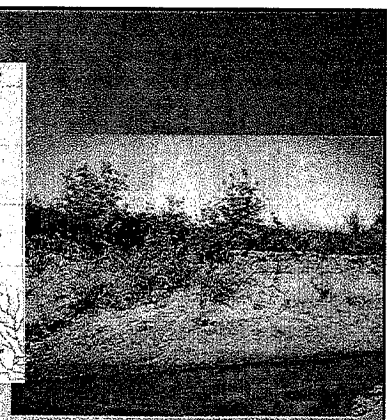
Kansas Water Office

Contents of Basin Approach

- Basin Description
- Water Supply and Demand
- Inventory of Restoration Approaches
- Identification of Water Conservation Opportunities
- Operational and Management Changes to Improve Supply
- Sediment Yield and Modeling
- Identification of Streambank Erosion, Extent and Status of Riparian Areas and Estimates of Restoration Needed
- Inventory of Watershed Structures and Sediment Yield Reductions
- Identification of Reservoirs Not Built
- Recommendations for Reservoir Sustainability Approach

Kansas Water Office





Sediment Yield Analysis and Watershed Modeling

- For the Neosho basin, determined that streambanks are the most significant source of sediment, especially along the mainstem. Confirms the need for systematic streambank stabilization, especially above John Redmond Reservoir.

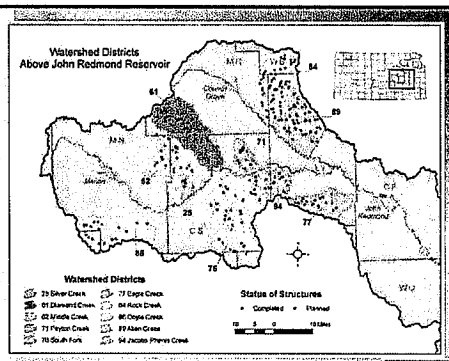
Kansas Water Office

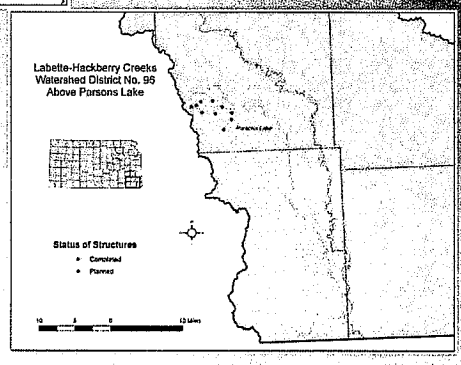
Protection
Streambank Stabilization

Kansas Water Office

Watershed Structures

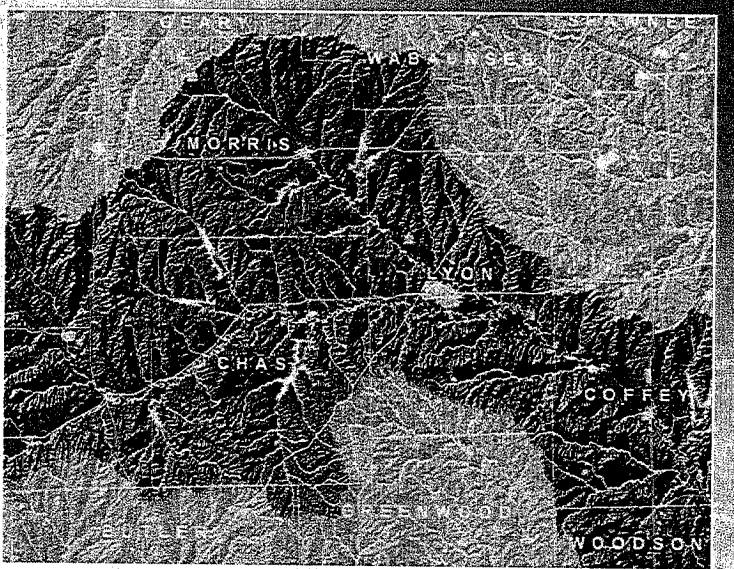
Inventoried both constructed and planned water retention structures and assessed the percentage of drainage area regulated by impoundments





Kansas Water Office

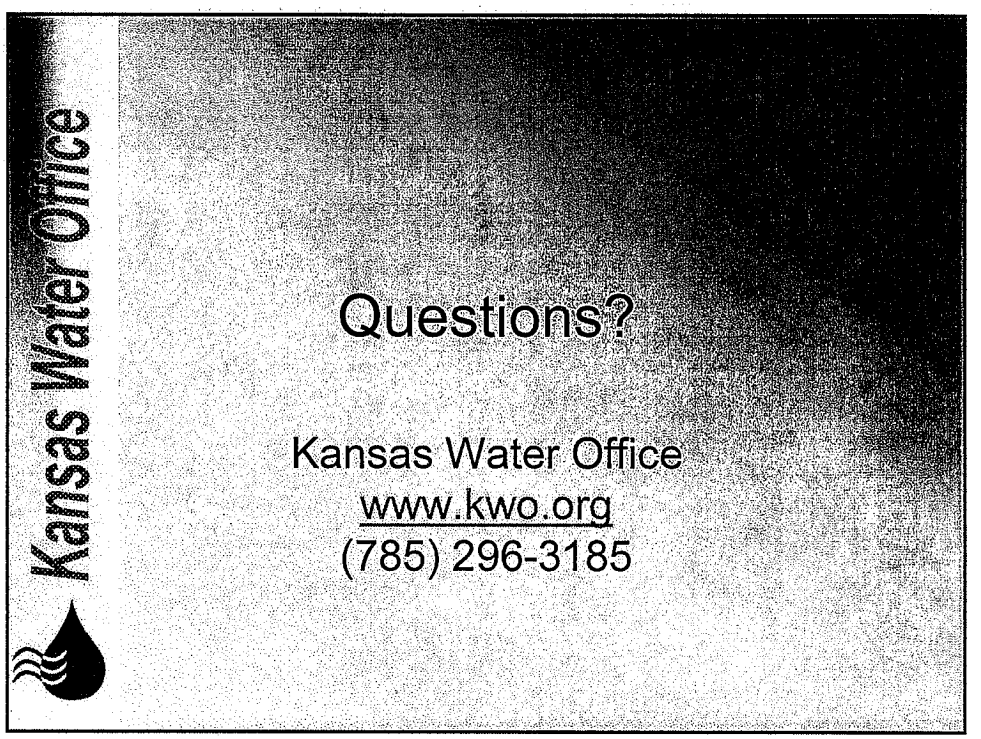
Potential Reservoir Sites above John Redmond



Kansas Water Office

Future Basin Approaches

- Recommend that the KWA conduct a similar analysis of reservoir sustainability for:
  - Verdigris basin (2010)
  - Marais des Cygnes (2011)
  - Smoky Hill-Saline (2012)
  - Walnut (2013)
  - Kansas River (2014)


Kansas Water Office
Questions?
Kansas Water Office
www.kwo.org
(785) 296-3185

Kansas Legislature Joint Committee on Energy & Environmental Policy

John Grothaus, Chief, Plan Formulation Section

Kansas City District – USACE

October 7, 2010

US Army Corps of Engineers®
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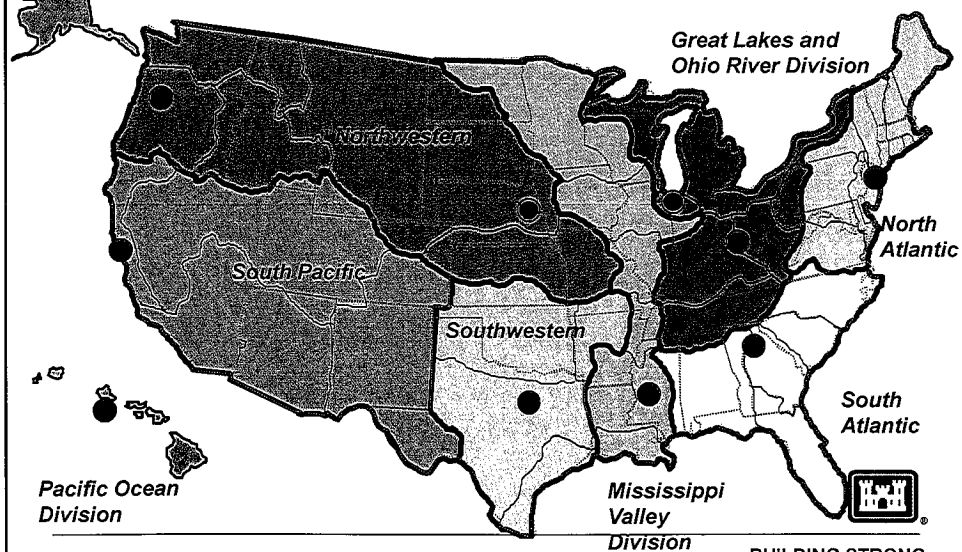
Corps of Engineers Divisions



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JOINT COMMITTEE ON ENERGY AND ENVIRONMENTAL POLICY
DATE: 10/7/10
ATTACHMENT 7

Corps of Engineers Missions

Civil Works – Water Resources Support to the Nation (Watershed Boundaries)

Military Program – Planning, Design & Construction Support to Army and Air Force Installations

HTRW – Hazardous, Toxic, and Radiological Waste Cleanup/ Remediation – EPA, DOE, DOD, Other

Overseas Contingency Operations – Afghanistan, Iraq, Other

Emergency Response Operations – Hurricanes, Floods, Other

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Civil Works Missions

Flood Risk Management (Flood Control)

Navigation

Fish & Wildlife Habitat Restoration

Water Supply

Recreation Support

Hydropower Supply

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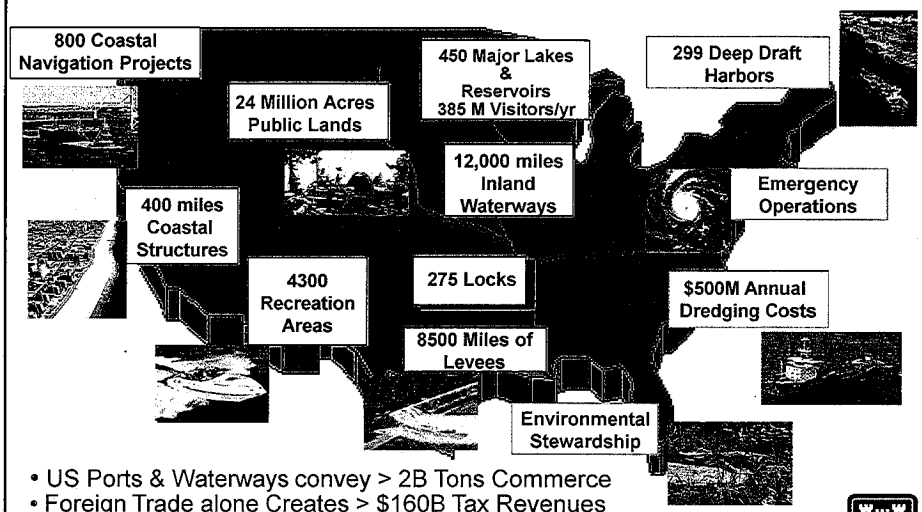
Civil Works Support to the Nation



- US Ports & Waterways convey > 2B Tons Commerce
- Foreign Trade alone Creates > $160B Tax Revenues
- Cumulative Flood Damage Prevention >$290B

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Corps of Engineers Responsibility

Waterways/Lakes and Authorized Purposes:

- ▶ Missouri River
- ▶ Kansas River
- ▶ Arkansas River

- ▶ Flood Control
- ▶ Irrigation
- ▶ Water Supply
- ▶ Navigation
- ▶ Fish and Wildlife
- ▶ Recreation
- ▶ Hydropower
- ▶ water Quality

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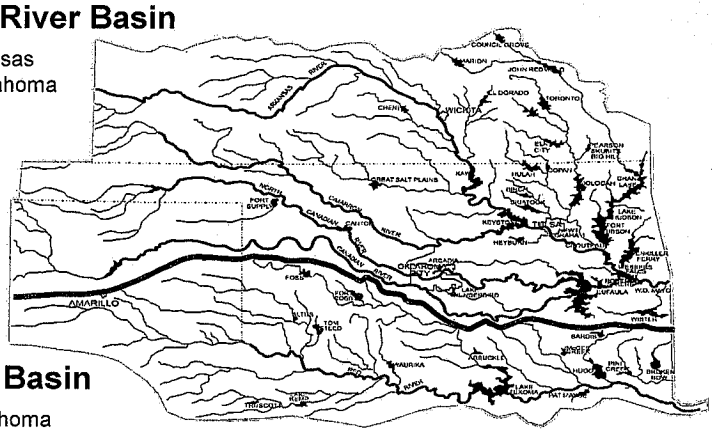
Tulsa District
Civil Works Boundary

Arkansas River Basin

Southern Kansas
Northern Oklahoma



Red River Basin

Southern Oklahoma
Northern Texas & Panhandle

Civil Works (Water Resources) Boundary - by River Basin

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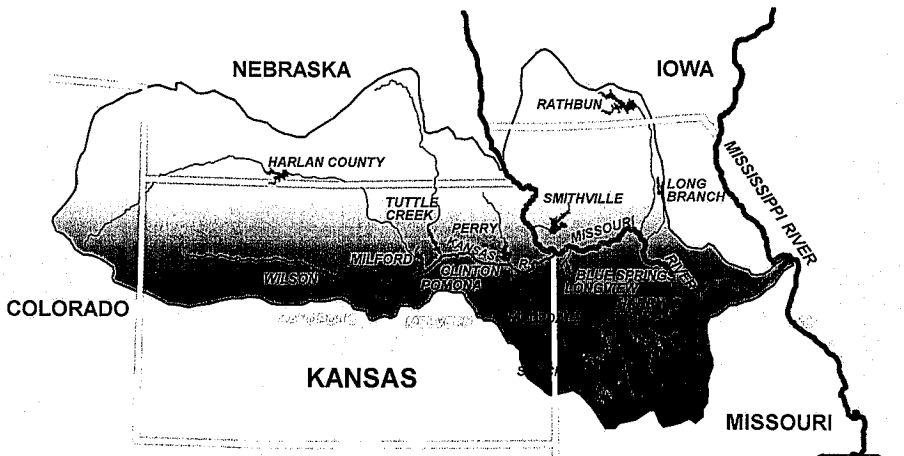
Kansas City District
Civil Works Boundary



Civil Works (Water Resources) Boundary - by River Basin

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Corps of Engineers Lakes in Kansas

Tulsa District (7)

- Big Hill
- Council Grove
- El Dorado
- Elk City
- John Redmond
- Marion
- Toronto

Kansas City District (9)

- Clinton
- Hillsdale
- Kanopolis
- Melvern
- Milford
- Perry
- Pomona
- Tuttle Creek
- Wilson

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Water Supply in Kansas Lakes

- Authorization: Section 6 of the Flood Control Act of 1944; Water Supply Act of 1958; and in some cases individual lake authorities
- State of Kansas owns storage in thirteen of the Corps federal reservoirs
- Federal Reservoirs provide water to approx. two-thirds of Kansas' citizens
- Corps sells storage, does not sell or warranty quantity of water available from storage (depends upon rainfall, watershed conditions, and lake geometry
- Water Supply Contracts
- Kansas Water Office - Kansas Water Authority - Water Marketing Programs

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Kansas City District
Water Supply Storage

Kansas City District Lakes in Kansas	Number of Water Supply Contracts	Total Water Supply Storage (ac-ft)*
Clinton Lake	1	89,200
Hillsdale Lake	1	53,000
Kanopolis Lake	1	12,500
Melvern Lake	1	50,000
Milford Lake	1	300,000
Perry Lake	1	150,000
Pomona Lake	2	32,770
Tuttle Creek Lake	3	50,000
Wilson Lake	0	-
Total	**11**	**737,470**

* Includes both in-service and future-use

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Tulsa District
Water Supply Storage

Tulsa District Lakes in Kansas	Number of Water Supply Contracts	Total Water Supply Storage (ac-ft)*
Big Hill (Pearson-Skubitz) Lake	1	25,700
Council Grove Lake	2	32,400
El Dorado Lake	1	142,800
Elk City Lake	2	30,180
John Redmond Lake	2	37,450
Marion Lake	2	44,730
Toronto Lake	2	400
Total	**16**	**313,660**

* Includes both in-service and future-use

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Corps of Engineers Programs

- Planning Assistance to States (PAS)
  - ► Cost shared (50/50) with state
  - ► Approx $1 million in Federal share last 3 years
- WRDA Section 204 / Regional Sediment
  - ► State Sediment Management Planning
  - ► 100% Federal Funding
  - ► $300,000 in last 2 years
- Operations & Maintenance (O&M) Program
- American Reinvestment and Recovery Act (ARRA)

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Bathymetric & LiDAR Surveys

- Planning Assistance to States(PAS)
  - ► Wilson & Kanopolis Lakes
  - ► LiDAR Surveys of lakes & watershed areas
- American Recovery and Reinvestment Act Lake O&M Funds (ARRA) - $300,000
  - ► Bathymetric Surveys of all Kansas lakes
  - ► LiDAR surveys of lake areas
  - ► Elevation-Capacity Curves

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Major Active Specifically Authorized "Line Item" Funded Studies / Projects

Kansas City District:

- Wilson Lake Reallocation Study
- Tuttle Creek Dam Safety Assurance Construction Project
- Missouri River Degradation Study
- Missouri River Authorized Purposes Study (MRAPS)
- Missouri River Recovery & Ecosystem Restoration Plan (MRRP & MRERP)

Tulsa District:

- John Redmond Reallocation Study
- John Redmond Feasibility Study

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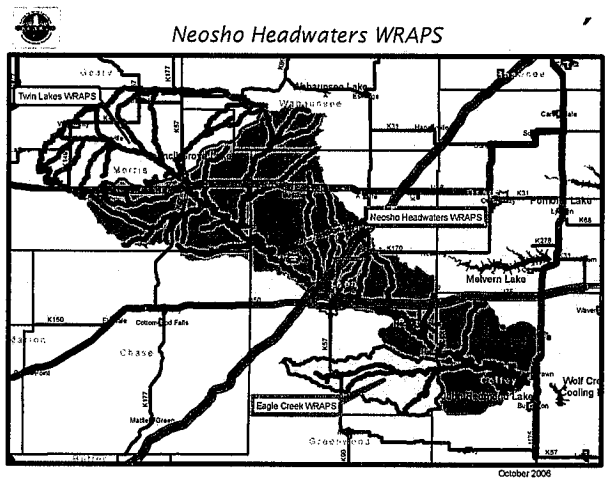
John Redmond Reservoir Feasibility Study



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John Redmond Feasibility Study

- Study cost share agreement signed with State of Kansas Sep 2006
- Focus on ecosystem restoration in and above the lake. Issues include sediment management, the log jam (upper portions of the lake), and dredging.
- Investigations indicated that log jam and dredging were not likely recommended for Federal participation due to costs and environmental considerations
- Refocus of the study is on watershed issues related to sedimentation and measures to reduce sediment.
- Includes monitoring the effectiveness of in-place upstream sediment control measures in collaboration with USGS.

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Missouri River Degradation Study

- Progressive and damaging degradation on the Missouri River - Kansas City reach
- $6.8 million, 5-6 years, comprehensive evaluation
- 50-50 cost sharing
- MARC sponsorship, multiple supporting partners
- KWO lead for KS, in-kind work to gather baseline conditions information
- Study cost sharing agreement pending approval and signing in August

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Missouri River Authorized Purposes Study (MRAPS)

- Omnibus Appropriations Act of 2009, Title I, Sec. 108:

The Secretary is authorized to conduct a study of the Missouri River Projects located **within the Missouri River basin** at a total cost of **$25,000,000** with the express purpose to review the original project purposes based on the Flood Control Act of 1944, as amended, and other-subsequent relevant legislation and judicial rulings to **determine if changes** to the authorized project purposes and existing Federal water resource infrastructure may be warranted: *Provided*, That this study shall be undertaken at **full Federal expense.**

MRAPS Path Forward - Next Steps

- Scoping Meeting Summary Report- Public Review- Early 2011
- Decision on Stakeholder Engagement Strategy- Early 2011
- Existing / Baseline Conditions Report – 2011-2012
- www.mraps.org- Provides updated information and status

Questions?

BUILDING STRONG®

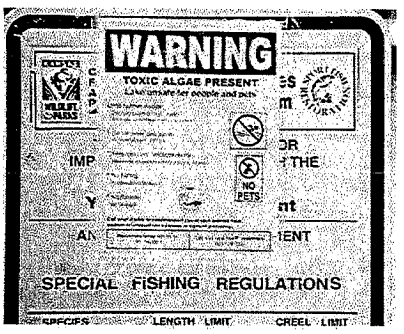
Kansas Reservoir Assessment:
Issues, Implications, and Initiatives

Dr. Edward A. Martinko
Kansas Biological Survey

KU KANSAS BIOLOGICAL SURVEY
The University of Kansas

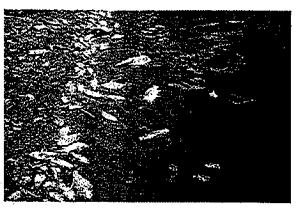
Council Grove City Lake

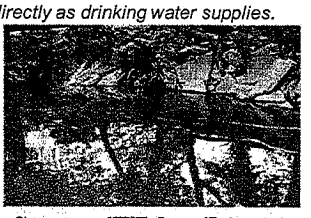
2010: Bad year for algae outbreaks in Kansas lakes



KDHE Advisories/Warnings:
Lovewell Reservoir
Central City Park Lake, Topeka
Veteran's Lake, Great Bend
Meade Lake, Meade
McKinley Lake, Great Bend
Centralia City Lake
Santa Fe Lake, Augusta

*Algae blooms also affected **Clinton Lake** and **Tuttle Creek Reservoir**, which are used directly or indirectly as drinking water supplies.*



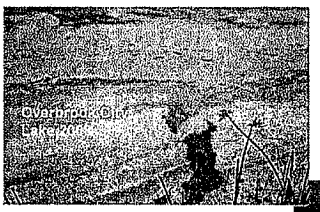


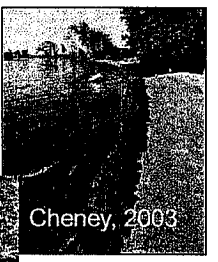
Picture courtesy of KDHE - Bureau of Environmental Field Services, Veteran's Lake, Barton County, KS

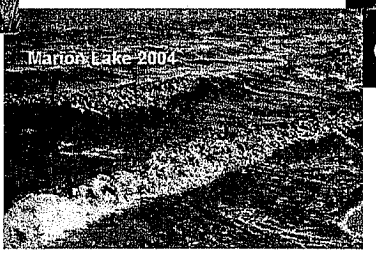
KU KANSAS BIOLOGICAL SURVEY
The University of Kansas

JOINT COMMITTEE ON ENERGY AND ENVIRONMENTAL POLICY
DATE: 10/7/10
ATTACHMENT 8

Algae outbreaks are increasingly common in Kansas







DANGER
LAKE CLOSED
due to harmful algae
KEEP OUT OF LAKE

"Following a three-week ordeal with anabaena algae in the Marion Reservoir, the water plants in Hillsboro and Marion were able to restore service in early July."
(Kansas Municipal Utilities Newsletter, August 2003)

KU KANSAS BIOLOGICAL SURVEY The University of Kansas

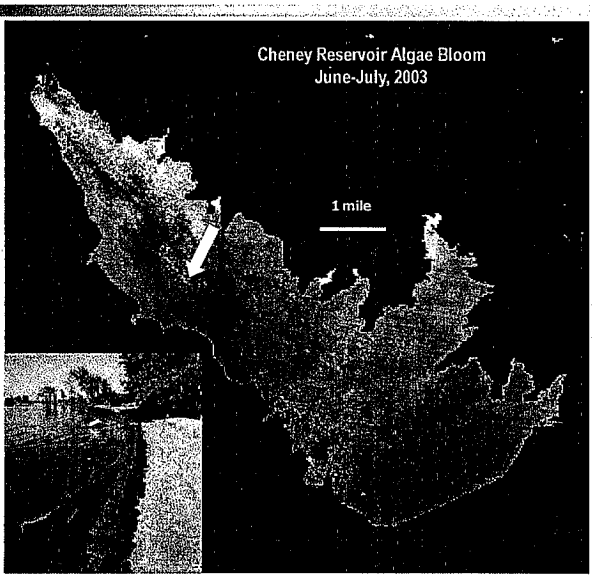
Algae outbreaks are increasingly common in Kansas

Algae blooms large enough to be seen by satellites in space

"Sick of that musty, earthy odor that has become all too familiar in Wichita's tap water?"

(Wichita Eagle, July 20, 2003)

Color-infrared satellite imagery detects algae blooms, shown in red on images.



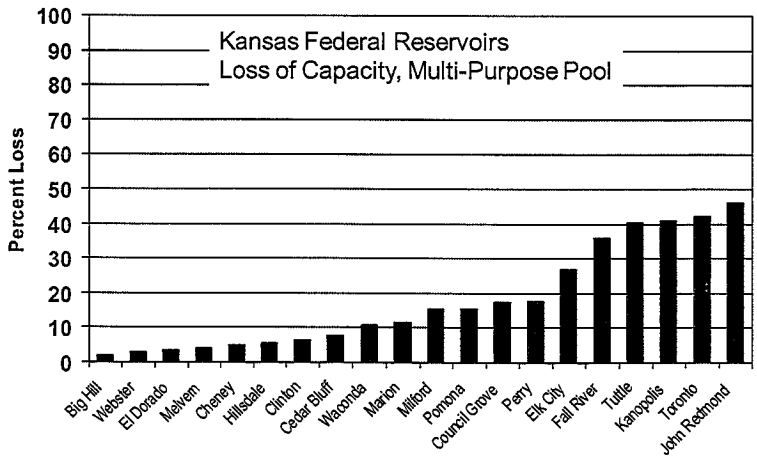
KU KANSAS BIOLOGICAL SURVEY The University of Kansas

Why are we having problems with our reservoirs ?

50-acre mud flat from sedimentation, Fall River Reservoir, 2010

KU KANSAS BIOLOGICAL SURVEY The University of Kansas

Why are we having problems with our reservoirs ?



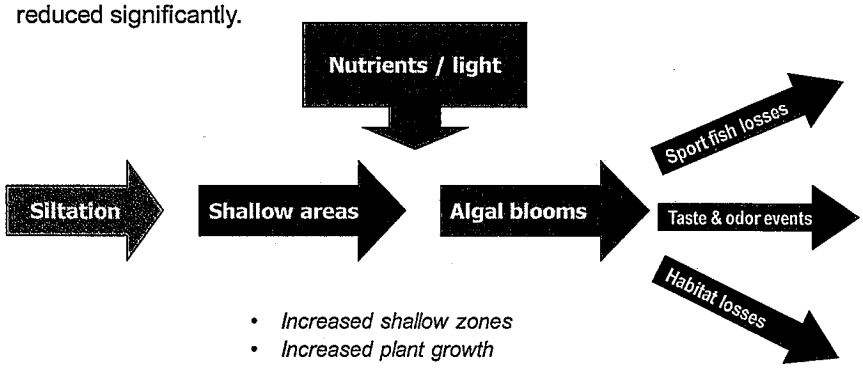
These 20 reservoirs were constructed from 1948-1981, and most are currently used as drinking water supplies

KU KANSAS BIOLOGICAL SURVEY The University of Kansas

Source: KWO

Why are we having problems with our reservoirs ?

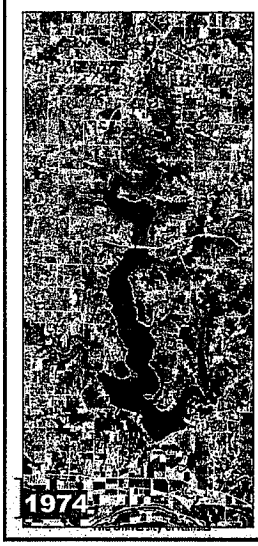
Sedimentation triggers numerous problems in the reservoir, even if overall capacity is not reduced significantly.

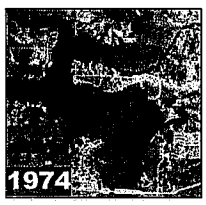


- *Increased shallow zones*
- *Increased plant growth*
- *Drinking water impairment*
- *Effects on fish populations*
- *Recreation impairment*
- *Loss of water storage*

KU KANSAS BIOLOGICAL SURVEY The University of Kansas

Severe sedimentation: Perry Lake Upper Basin

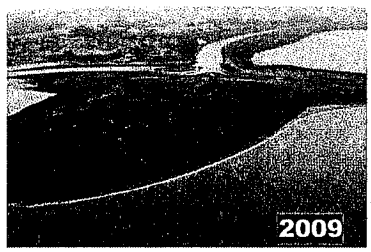




Accumulation since construction in 1969

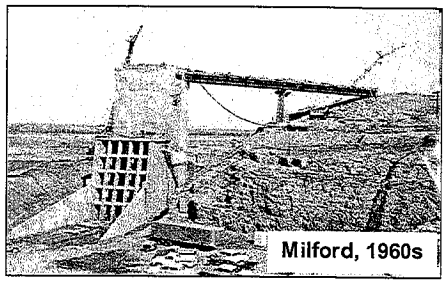
Estimated 1000+ acres surface area lost

18% of water storage capacity lost (2005)

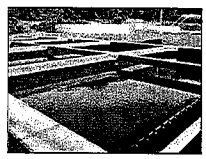


Federal reservoirs were originally built for specific purposes

<u>Economic Infrastructure</u>
Flood control
Irrigation
Hydropower
Recreation



BUT – **Drinking water** has become a critical resource supplied by these reservoirs



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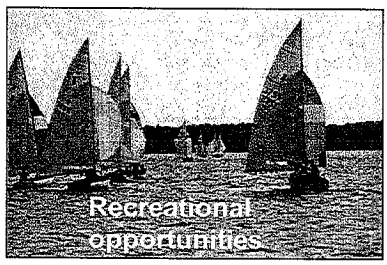
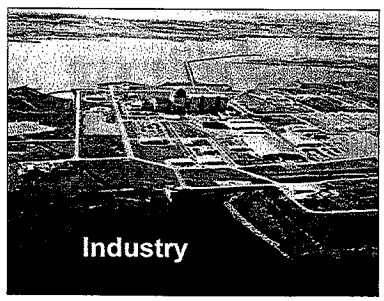
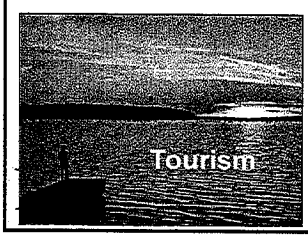
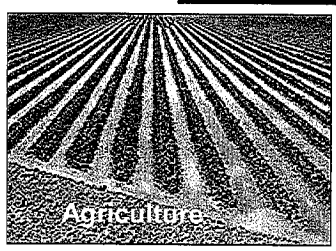
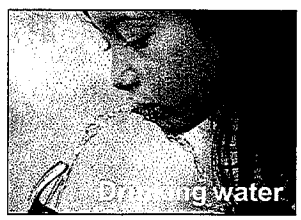
Reservoirs provide critical economic benefits to the state



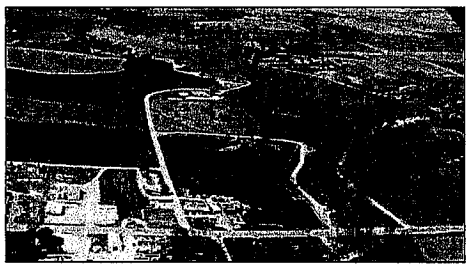






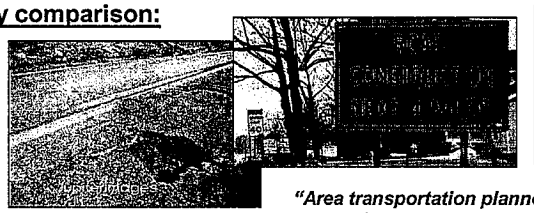


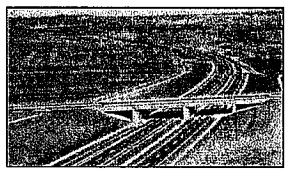
Reservoirs should be thought of as critical economic infrastructure: a multi-billion dollar investment



"...the City of Horton is going to be limited in economic and population growth by the amount of water that is available to the City.... (City of Horton, 2006)

By comparison:





"Area transportation planners have identified $732 million worth of road projects needed in Douglas County between now and 2030." (Lawrence Journal-World, 2/2/08)

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Some Real Costs of Reservoir Impairment in Kansas

City of Wichita –

- $750,000/year additional for drinking water treatment.
- $3.5 million for treatment plant changes.
- $7.5 million for new ozone plant.

City of Lawrence –

- $500,000/year in estimated additional costs for continuous drinking water treatment.

City of Hillsboro –

- ~ $25,000/year in estimated additional costs for continuous drinking water treatment.

City of Horton –

- $4 million bond issue for dredging Mission Lake.
- $2.6 million additional contributed by State of Kansas (SCC).

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Critical Questions for the State of Kansas

- *What is the current status of our lakes and reservoirs ?*
- *What causes our lakes and reservoirs to become impaired (loss of water quantity and quality) ?*
- *Where and when are critical problems likely to occur in our lakes and reservoirs ?*
- *Can we proactively manage and plan for reservoir sustainability ?*

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Integrated Reservoir Assessment

In support of the objectives of securing, protecting, and restoring reservoirs in our state.

Assessing the Current Status of Our Reservoirs:

Bathymetric Mapping
- Current capacity ?
- Historic capacity ?
- How much capacity has been lost ?

Sediment surveys
- Sediment thickness ?
- Rates and spatial patterns of deposition ?
- Chronological pattern of deposition ?
- Nutrients and chemical contaminants ?

Water Quality Status

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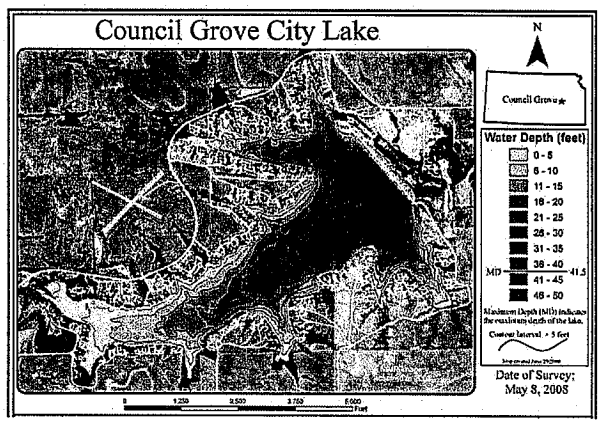
Bathymetric surveys to calculate reservoir capacity and change in capacity over time



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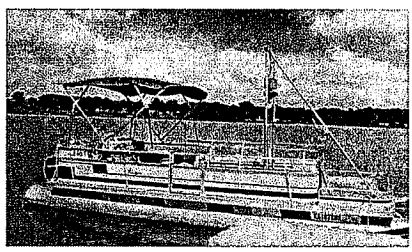
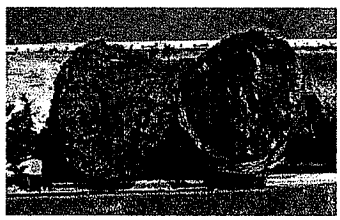
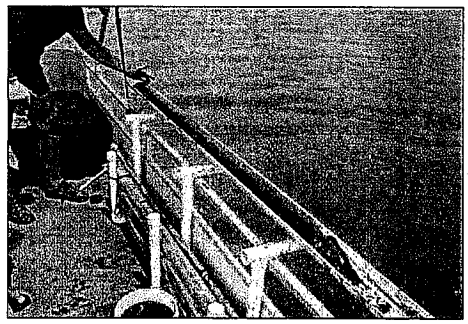
Sediment surveys to assess sediment thickness and physical /chemical properties







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Integrated Reservoir Assessment

In support of the objectives of securing, protecting, and restoring reservoirs in our state.

Understanding Reservoir Impairment and Change:

- Rates and patterns of sedimentation:
  - Repeated bathymetric surveys
  - Comparison to past bathymetric and sediment surveys
  - Chronological analysis of sedimentation rates
- Land use/land cover change:
  - Changes in land use that may accelerate / slow sedimentation
  - Seasonal changes in watershed conditions
- Drought and climate effects:
  - Water availability (precipitation and runoff)
  - Weather as drivers of sedimentation and algae blooms

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Many reservoirs in the state have not been mapped for decades – and most have never been mapped.

Reservoirs mapped by KBS for KWO

ALMA CITY LAKE
AUGUSTA LAKE
AUGUSTA SF LAKE
BANNER CREEK LAKE
CEDAR VALLEY LAKE
CENTRALIA LAKE
CLINTON RESERVOIR
COUNCIL GROVE CITY LAKE
COUNCIL GROVE RESERVOIR
EL DORADO LAKE
ELK CITY LAKE
EUREKA LAKE
FALL RIVER LAKE
FT. SCOTT CITY LAKE
HERINGTON LAKE
HILLSDALE RESERVOIR
JOHN REDMOND RESERVOIR
KANOPOLIS RESERVOIR
LAKE SHAWNEE
LEAVENWORTH CO. SFL
LOUISBURG SFL
MADISON CITY LAKE
MELVERN LAKE
MIOLA LAKE
MISSION LAKE
MOLINE CITY LAKE
OLPE CITY LAKE
OSAGE CO. SFL
OSAGE CITY LAKE
PARSONS LAKE
PLEASANTON RESERVOIR
POMONA LAKE
POTTAWATOMIE CO SFL #1
PONY CREEK LAKE
ROCK CREEK LAKE
SEVERY CITY LAKE
SOUTH OWL LAKE
TORONTO LAKE
WABAUNSEE LAKE
WELLINGTON CITY LAKE
WILSON RESERVOIR
WILSON CO. SFL
WOODSON CO. SFL
WINFIELD CITY LAKE
WOLF CREEK LAKE
WYANDOTTE CO. LAKE
YATES CENTER RESERVOIR

Some reservoirs that are NOT yet mapped:

ANTHONY CITY LAKE
ATCHISON CO. SFL
BARBER CO. SFL
BLUE MOUND CITY LAKE
BOURBON CO. SFL
BROWN CO SFL
BUTLER CO. SFL
CEDAR BLUFF LAKE
CHANUTE SF LAKE
CHASE CO. SFL
CHENEY LAKE
CLARK CO. SFL
COWLEY CO. SFL
DOUGLAS CO SFL
FORD CO. LAKE
GARDNER CITY LAKE
GEARY CO. SFL
GOODMAN SFL
HARVEY CO. EAST LAKE
HARVEY CO. WEST LAKE
JEWELL CO. SFL
KINGMAN CO SFL
KIRWIN LAKE
LAKE AFTON
LAKE CRAWFORD
LAKE KAHOLA
LAKE MEADE
LAKE SCOTT
LAKE WEATHERBY
LONE STAR LAKE
LOVEWELL LAKE
LYNDON CITY LAKE
LYON CO. SFL
MARAIS DES CYGNES
MARION CO. LAKE
MCPHERSON CO. SFL
MONTGOMERY CO. SFL
MIAMI CO SFL
MALLARD LAKE
CIMARRON LAKE
MOUND CITY LAKE
NEOSHO CO. SFL
NEOSHO WA
NORTON LAKE
OTTAWA CO. SFL
POLK DANIELS LAKE
POTTAWATOMIE CO SFL #2
PRATT CO. LAKE
RICHMOND CITY LAKE
ROOKS CO. SFL
SABETHA CITY LAKE
SEDAN CITY NORTH LAKE
SEDAN CITY SOUTH LAKE
SHAWNEE CO. SFL
SHAWNEE MISSION LAKE
SHERIDAN CO. SFL
THAYER NEW CITY LAKE
WACONDA LAKE
WASHINGTON CO SFL
WEBSTER LAKE
XENIA LAKE

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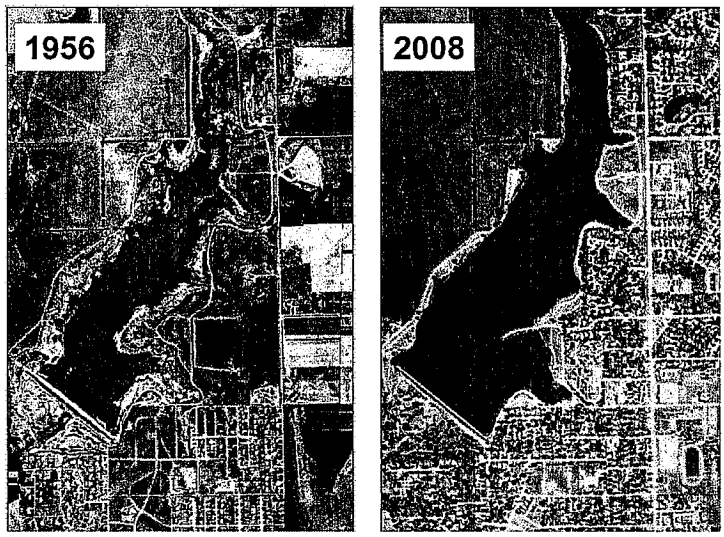
Watershed land use/land cover change

Urban growth around Augusta Lake, 1956-2008

Urbanization and development can alter runoff patterns in a watershed.



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Integrated Reservoir Assessment

In support of the objectives of securing, protecting, and restoring reservoirs in our state.

Modeling and Predicting Critical Problems in Reservoirs:

- Predictive computer modeling of algae blooms:
  - Where, when, and why are algae blooms occurring ?
  - What conditions trigger algae blooms that lead to T & O events ?
- Predictive warning system for taste-and-odor events in drinking water reservoirs:
  - Computer models to provide warning of drinking water impairments.
- Dam breach inundation modeling

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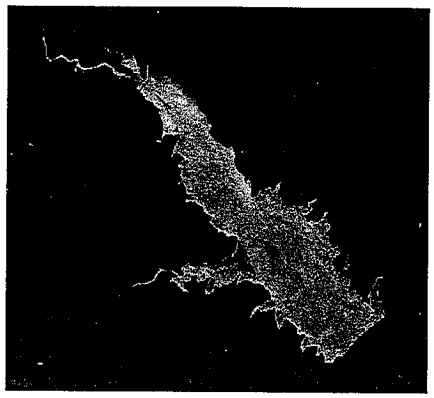
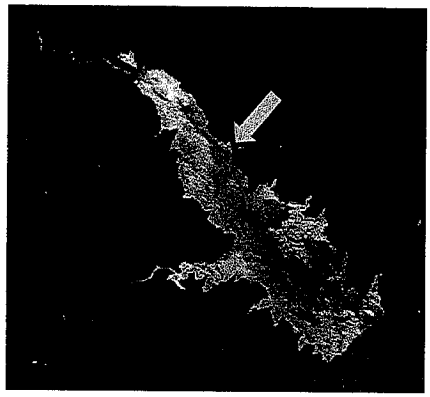
Predictive modeling of algae blooms in reservoirs

April 21, 2003
Satellite image of Marion Reservoir
No algae bloom detected by satellite



July 10, 2003
Satellite image of Marion Reservoir
Severe algae bloom detected by satellite



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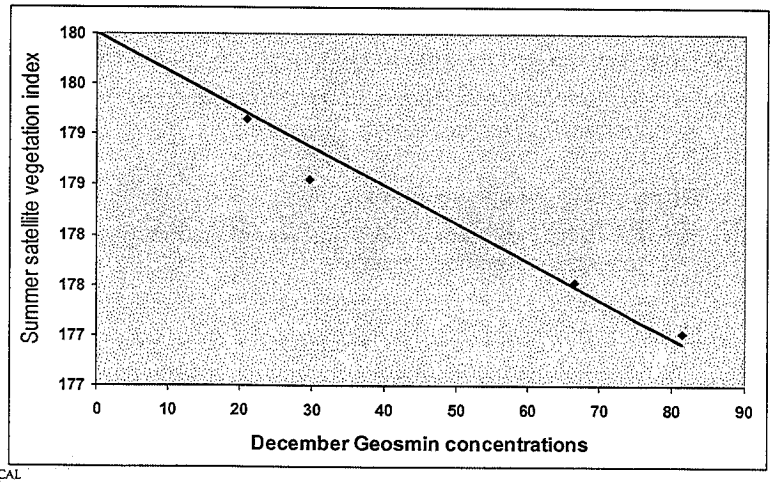
"Following a three-week ordeal with anabaena algae in the Marion Reservoir, the water plants in Hillsboro and Marion were able to restore service in early July."
(Kansas Municipal Utilities Newsletter, August 2003)

Predictive warning system for taste-and-odor events in drinking water reservoirs

Research suggests that satellite imagery of watershed conditions from several months earlier may provide advance warning of taste&odor events



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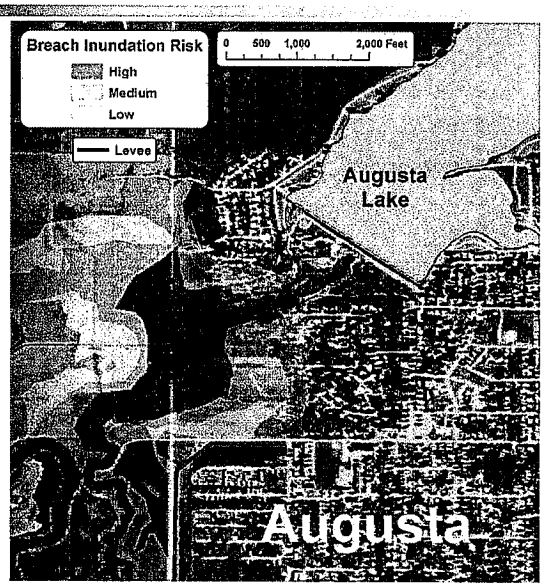
Dam breach inundation modeling
Augusta City Lake

Notes

- Assumed lake at maximum capacity
  - → *3432 ac-ft* [source: 2010 NID]
- Assumed no violation of levee
  - → *levee location provided by Tulsa USACE, but top-of-levee elevation is not known*
- Used 10-m USGS topographic data
  - → *current, high quality elevation data (e.g., LIDAR) are not available for this site*
- Hydraulics not considered
  - → *results based solely on topography and basic hydrologic principles*
  - → *flood wave propagated downstream using preservation of release volume*
- Manner of breach not specified
  - → *risk map can vary substantially using different breach scenarios*



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Integrated Reservoir Assessment

In support of the objectives of securing, protecting, and restoring reservoirs in our state.

Decision Support and Planning for Reservoir Sustainability:

- Decision support for potential reservoir siting:
  - Models for identifying optimal new reservoir sites that maximize storage / minimize impacts.
- Reservoir inundation modeling:
  - Modeling proposed reservoir conservation pool changes and reservoir restoration strategies.
- Simulation of watershed management scenarios:
  - Applying computer modeling to identify win-win scenarios for watershed management and reservoir sustainability.

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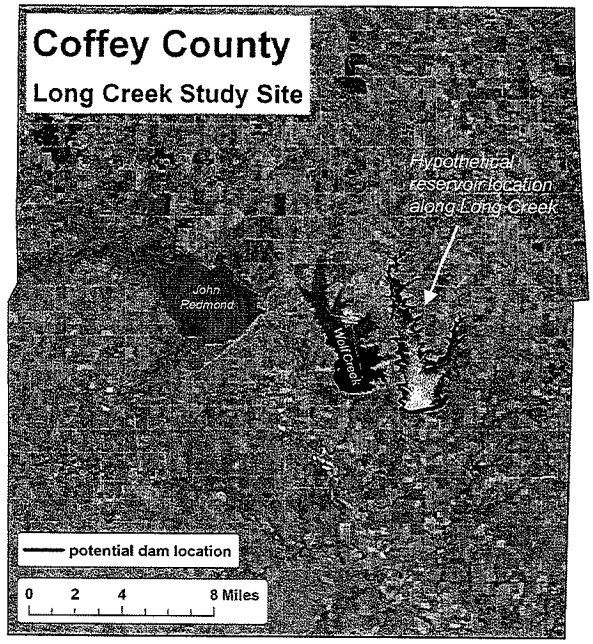
Siting New Reservoirs: KBS-KWO study

Notes

- Initial assessment will focus on ***physical suitability*** factors:
  - → *optimal lake geometry*
  - → *efficient dam placement*
  - → *adequacy & proximity of water supply*
- Secondary assessment will focus on ***social, biological, and economic*** factors:
  - → *human impacts*
  - → *ecosystem impacts*
  - → *cost effectiveness*
  - → *functionality, maintenance, & life expectancy*



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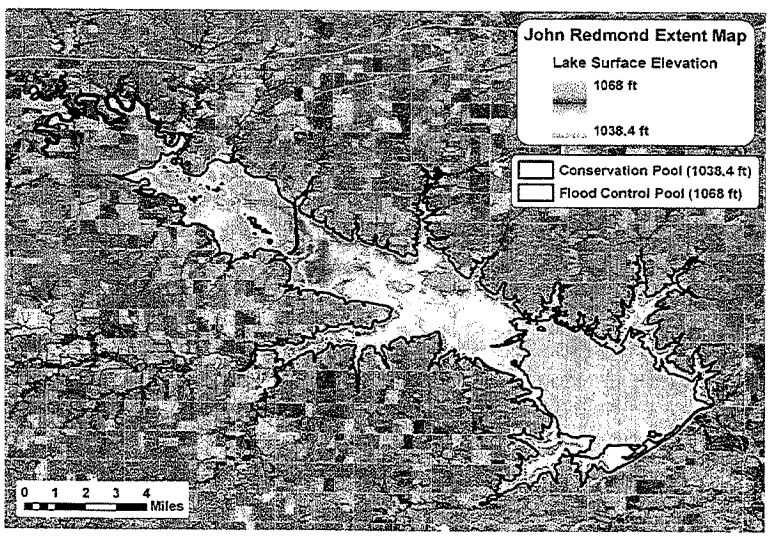
Modeling reservoir inundation scenarios

Management practices may include raising water levels



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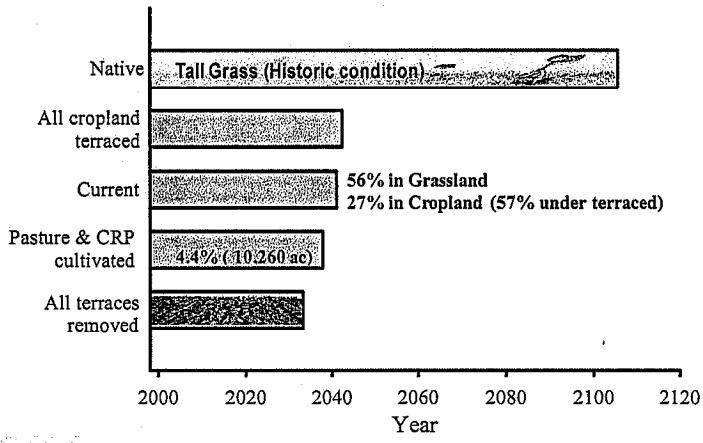
Modeling Reservoir Life Span: Watershed Management Practices Scenarios

Lifespan of Clinton Lake under different watershed scenarios



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Integrated Reservoir Assessment

In support of the objectives of securing, protecting, and restoring reservoirs in our state.

Reservoir Information Access

How can decisionmakers and stakeholders access information about Kansas reservoirs ?

- Information distributed across federal, state, local agencies, libraries, stakeholder groups, universities, and other entities.
- Need for decision and management policy tools

Reservoir Assessment Database

- An online "portal" for enhancing access to reservoir data.
- Improving user access to information on specific reservoirs.

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Reservoir Assessment Database

An online "portal" for enhancing access to data and information for reservoir assessment

Elements:

- Bathymetric surveys: Maps and data
- Sediment surveys: Maps, data, and analysis results
- Links to water flow data (USGS, EPA, Corps of Engineers)
- Links to water quality data (EPA, COE, CPCB, KDHE).
- Watershed maps and data
- Decision support models for flooding, taste&odor, etc.
- Links to map, photo, and document servers with reservoir info.

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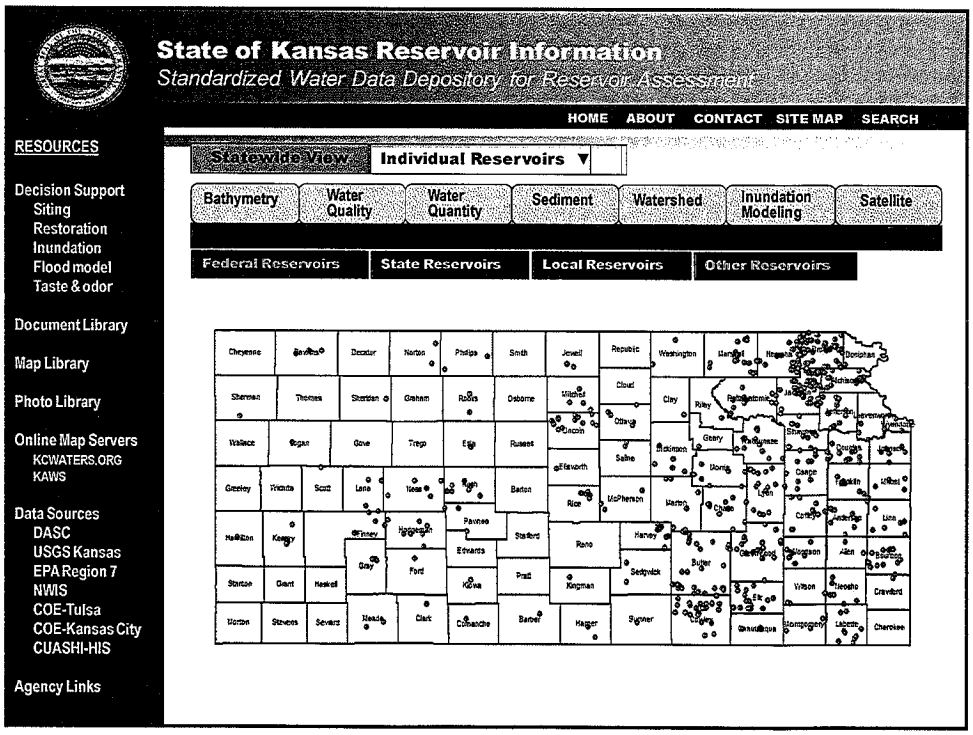
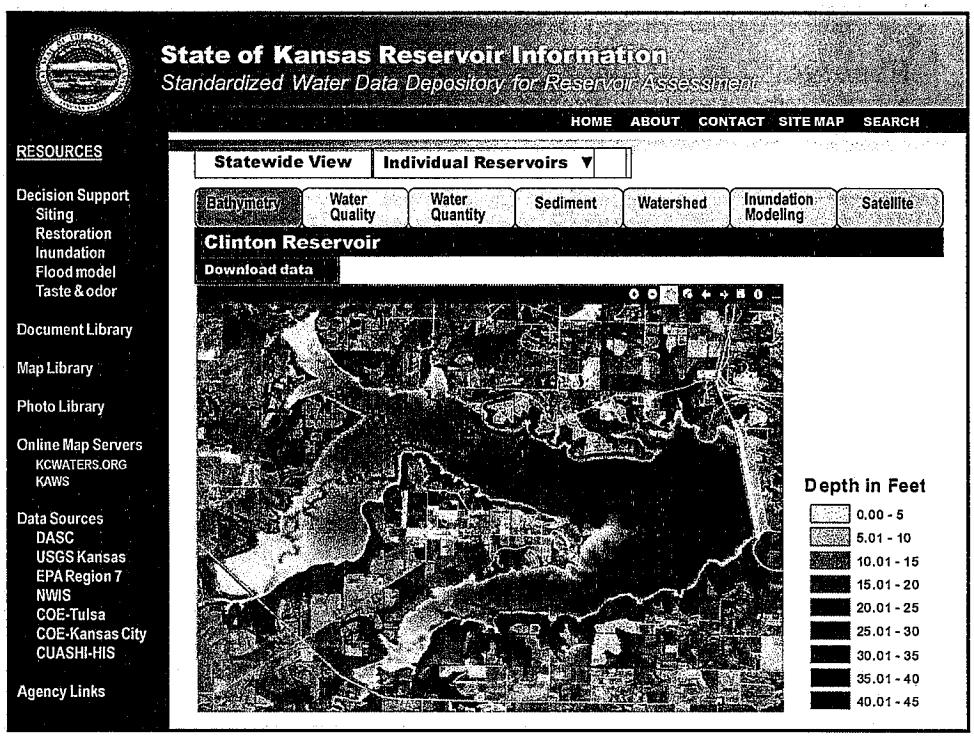
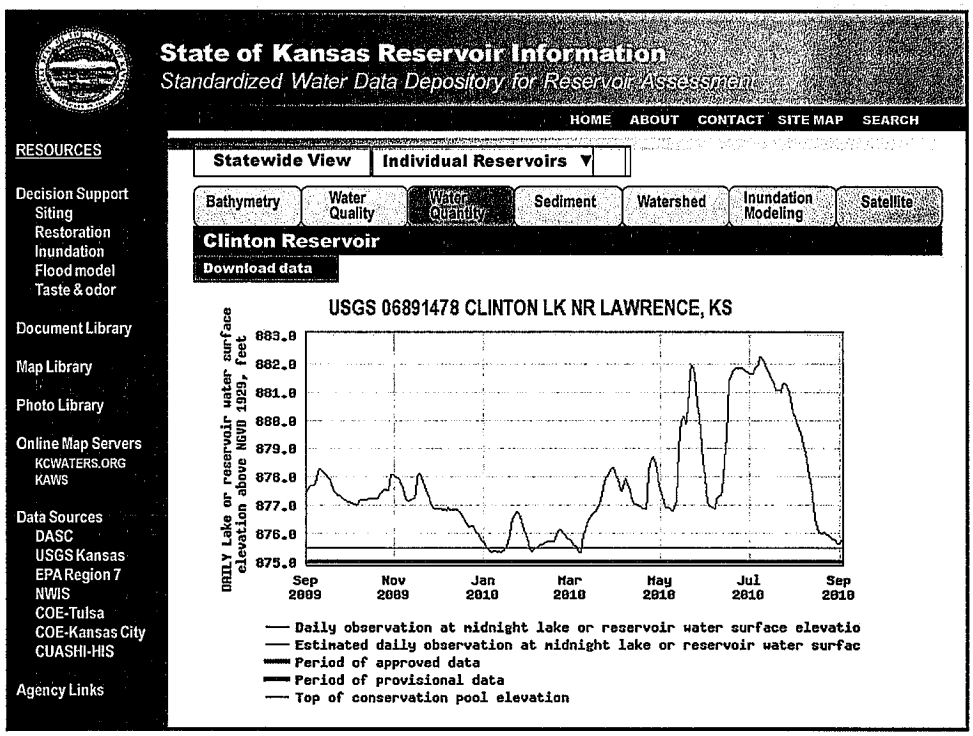



State of Kansas Reservoir Information
Standardized Water Data Depository for Reservoir Assessment
HOME ABOUT CONTACT SITE MAP SEARCH
RESOURCES
Decision Support
Siting
Restoration
Inundation
Flood model
Taste & odor
Document Library
Map Library
Photo Library
Online Map Servers
KCWATERS.ORG
KAWS
Data Sources
DASC
USGS Kansas
EPA Region 7
NWIS
COE-Tulsa
COE-Kansas City
CUASHI-HIS
Agency Links
Statewide View
Individual Reservoirs
Bathymetry
Water Quality
Water Quantity
Sediment
Watershed
Inundation Modeling
Satellite
Clinton Reservoir
Download data
Depth in Feet
0.00 - 5
5.01 - 10
10.01 - 15
15.01 - 20
20.01 - 25
25.01 - 30
30.01 - 35
35.01 - 40
40.01 - 45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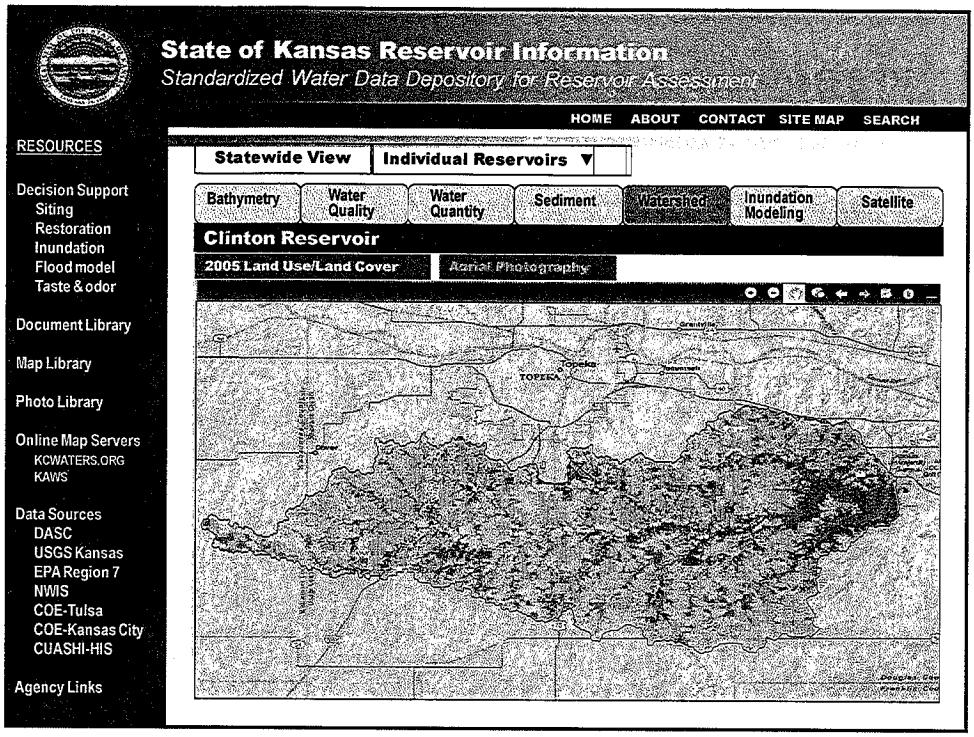
KAWS
Data Sources
DASC
USGS Kansas
EPA Region 7
NWIS
COE-Tulsa
COE-Kansas City
CUASHI-HIS
Agency Links
Statewide View
Individual Reservoirs
Bathymetry
Water Quality
Water Quantity
Sediment
Watershed
Inundation Modeling
Satellite
Clinton Reservoir
Download data
USGS 06891478 CLINTON LK NR LAWRENCE, KS
DAILY Lake or reservoir water surface elevation above NGVD 1929, feet
883.0
882.0
881.0
880.0
879.0
878.0
877.0
876.0
875.0
Sep 2009
Nov 2009
Jan 2010
Mar 2010
May 2010
Jul 2010
Sep 2010
Daily observation at midnight lake or reservoir water surface elevatio
Estimated daily observation at midnight lake or reservoir water surfac
Period of approved data
Period of provisional data
Top of conservation pool elevation



KBS Decision Support Experience

A history of cooperative initiatives in developing decision support systems

- Kansas Geographic Information System – for State of Kansas
  - Legislatively mandated, coordinating with 23 state agencies
  - Kansas Interagency Task Force on Applied Remote Sensing
  - Kansas Commission on Applied Remote Sensing
- Kansas Natural Resource Planner – for KDWP
  - Designed to assist in the planning of development projects
- Kansas Water Resources Planner – for Wichita-REAP / KWO
  - Supports land use and development decisions in the greater Wichita area
- KCWATERS.ORG – with EPA and Kansas City urban area
  - Online databases for urban water quality.

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KBS Decision Support Experience

A history of cooperative initiatives in developing decision support systems

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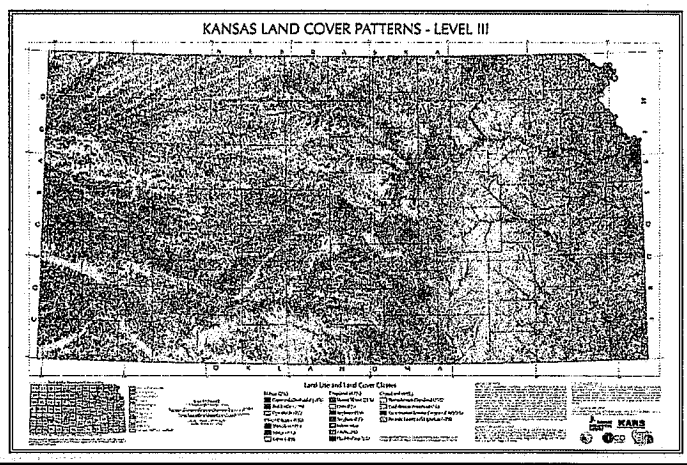
Legislatively mandated, coordinating with 23 state agencies
Kansas Interagency Task Force on Applied Remote Sensing
Kansas Commission on Applied Remote Sensing

Land use/land cover map developed under funding from Kansas Water Plan via GIS Policy Board



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KBS Decision Support Experience

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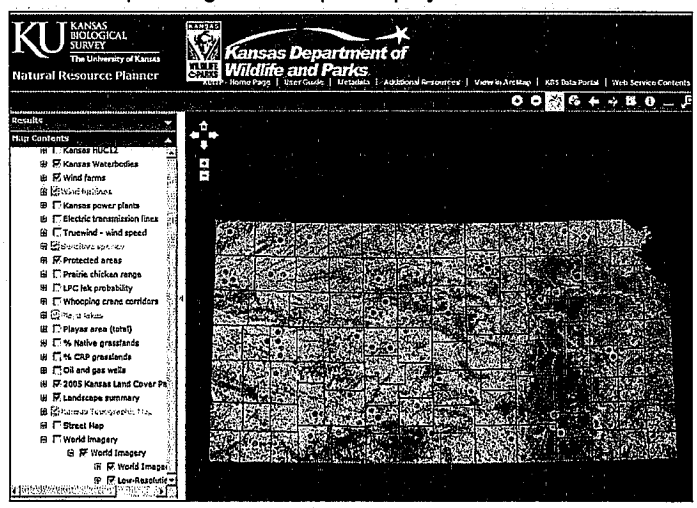
Kansas Natural Resource Planner – for KDWP

Designed to assist in the planning of development projects



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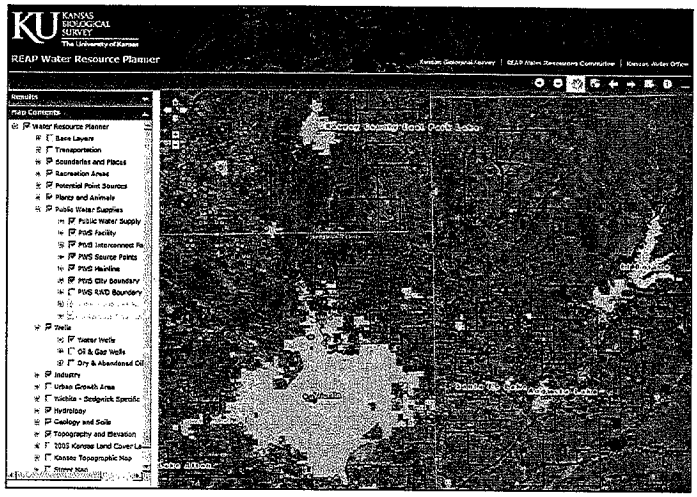
KBS Decision Support Experience

A history of cooperative initiatives in developing decision support systems

Kansas Water Resources Planner – for Wichita-REAP / KWO

Supports land use and development decisions in the greater Wichita area



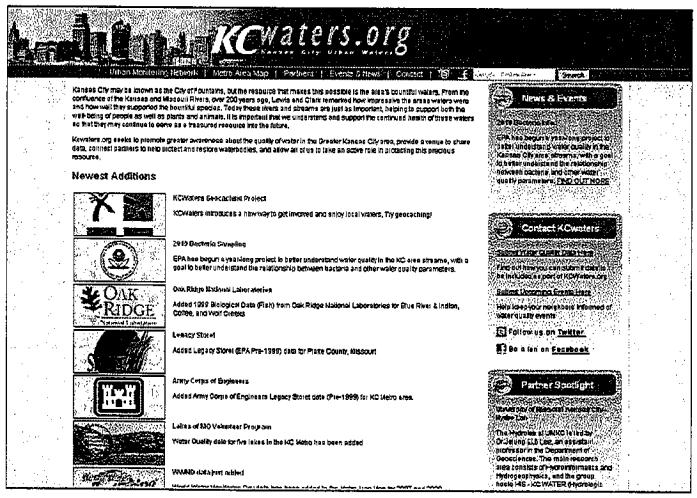
KU KANSAS BIOLOGICAL SURVEY
The University of Kansas

KBS Decision Support Experience

A history of cooperative initiatives in developing decision support systems

KCWATERS.ORG – with EPA and Kansas City urban area

Online databases for urban water quality



KU KANSAS BIOLOGICAL SURVEY
The University of Kansas

Reservoir Assessment Database

An online "portal" for enhancing access to data and information for reservoir assessment

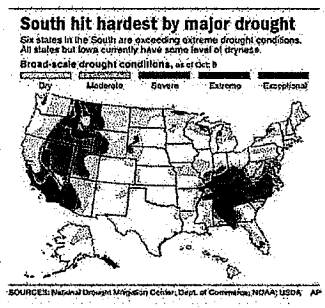
Cooperative efforts with EPA and USACOE in developing the **Reservoir Assessment Database:**

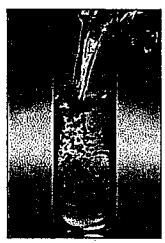
- EPA Region 7
  - Commitment for technical support for database development
  - Access to Region 7 water quality databases for Kansas
- US Army Corps of Engineers
  - Bathymetric mapping
  - Ongoing discussions on collaboration

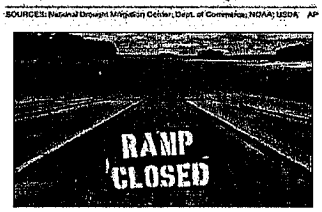
KU KANSAS BIOLOGICAL SURVEY The University of Kansas

Cities dependent upon reservoirs for drinking water have been crippled by water shortages

Lake Lanier, Georgia, 2008 drought







KU KANSAS BIOLOGICAL SURVEY The University of Kansas

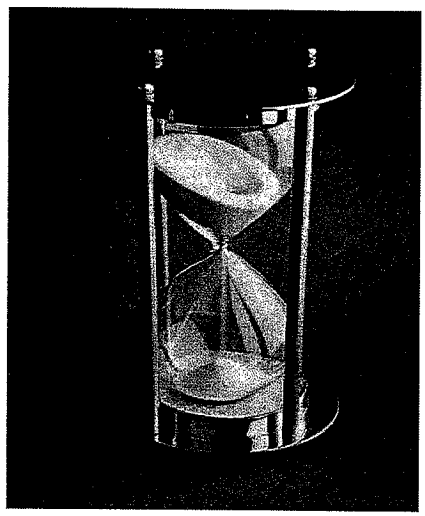
Sedimentation in Our Reservoirs:

Are They Half Full

or

Half Empty ?

YES.



KU KANSAS BIOLOGICAL SURVEY
The University of Kansas

Dredging Creates a Cleaner Environment and Stronger Economy

DREDGE AMERICA

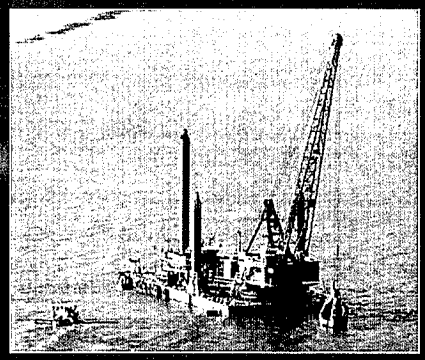
What is dredging?

- Removal of material or excavation from under a body of water
- Types of dredging:
  - Mechanical – backhoe, clamshell, or dragline from shore or from a barge
  - Hydraulic

DREDGE AMERICA

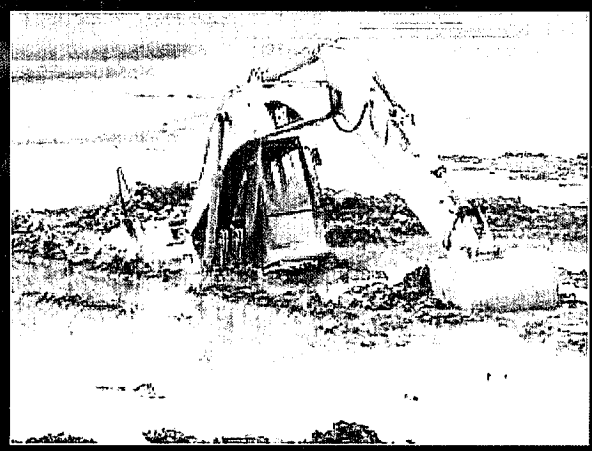
JOINT COMMITTEE ON ENERGY AND ENVIRONMENTAL POLICY
DATE: 10/7/10
ATTACHMENT 9

Mechanical Dredging



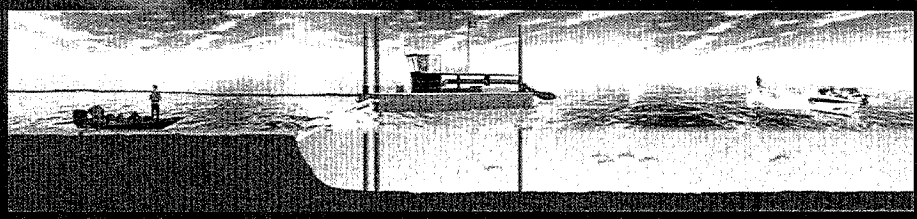
DREDGE AMERICA

Drain and Excavate Mechanically



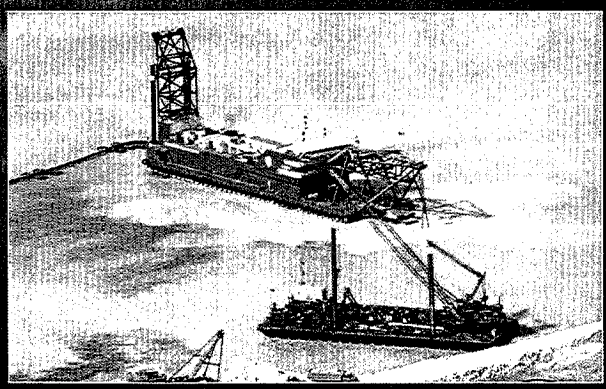
DREDGE AMERICA

Hydraulic Dredging

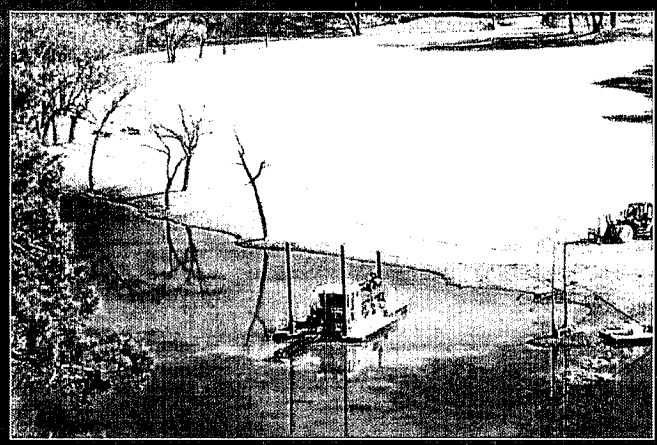


"Vacuuming" material from underwater and pumping to another location through pipeline. The environmental choice for water quality.

Deep Draft Hydraulic Dredging

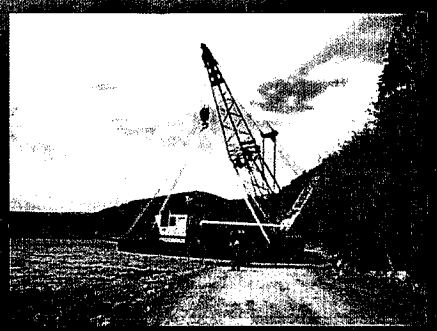


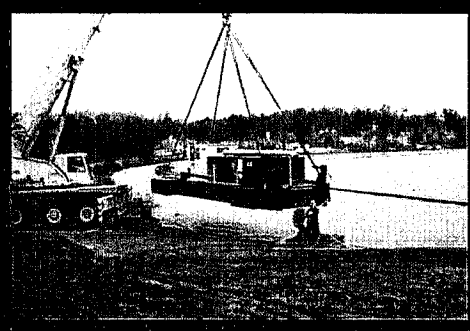
Shallow Draft Hydraulic Dredging



DREDGE AMERICA

Portable Dredging





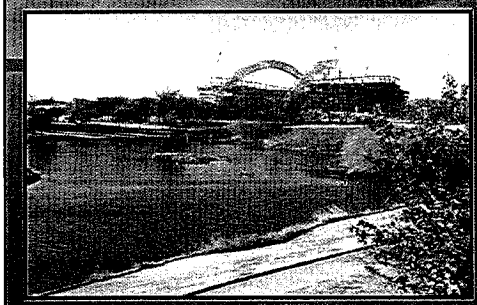
Portable hydraulic dredges can be trucked to job site vs. large dredges brought through major waterways

DREDGE AMERICA

Millbrook Lake - Arlington, TX

DREDGE AMERICA

Ranger Lake-Arlington, TX



Before

During

After

DREDGE AMERICA

Boys Town
Boys Town, NE

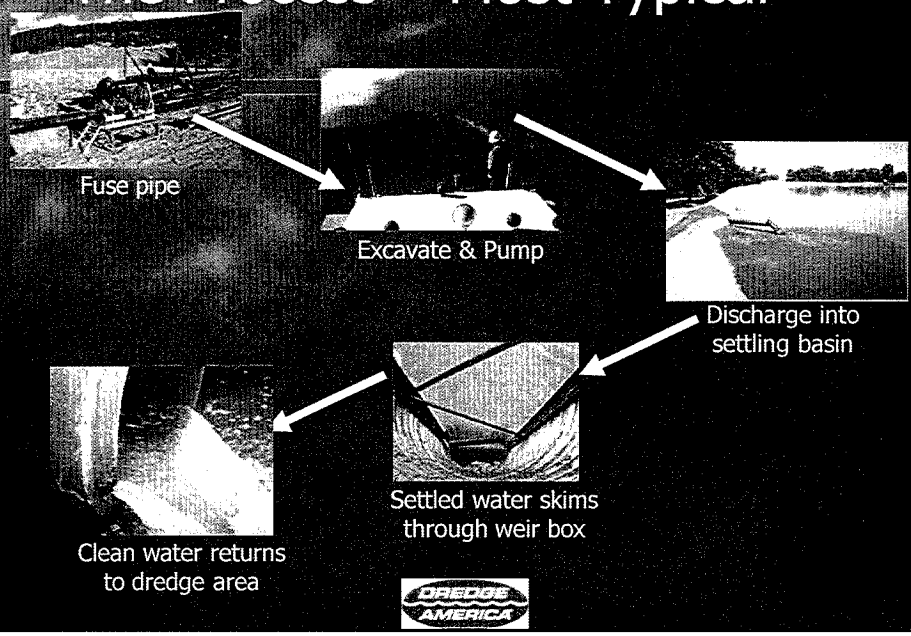
DREDGE AMERICA

Why dredge?

- Increase water depth
- Improve water quality
- Improve wildlife habitats
- Increase water storage capacity
- Increase sediment settling capacity
- Decrease flooding
- Create Wetlands

DREDGE AMERICA

The Process – Most Typical



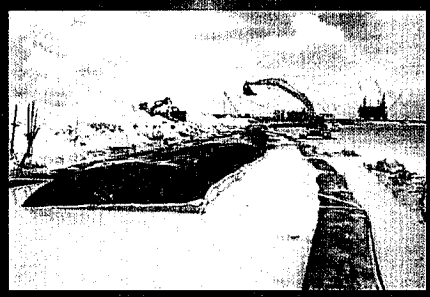
DREDGE AMERICA

Where to put the Sediment?

- In a typical confined disposal facility (CDF)
- Create islands
- Create wetlands
- Into geotubes – Temporary or Permanent
- Mechanically dewatered and trucked offsite

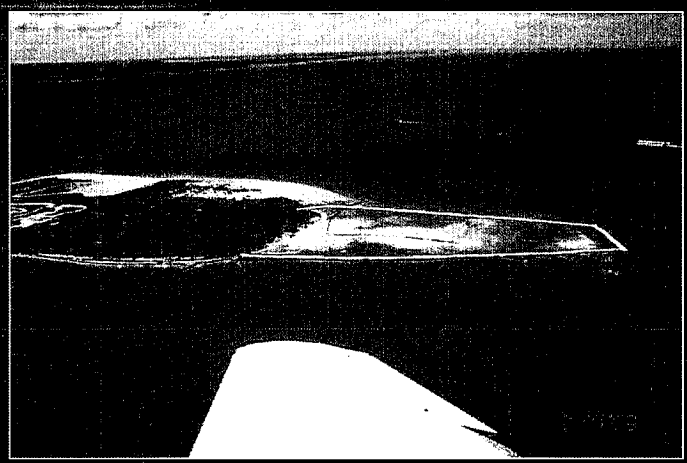
DREDGE AMERICA

Dredging into Geo-textile Tubes
Permanent Installations and Temporary for Dewatering



DREDGE AMERICA

Bird Island- Matigorda,TX



DREDGE AMERICA

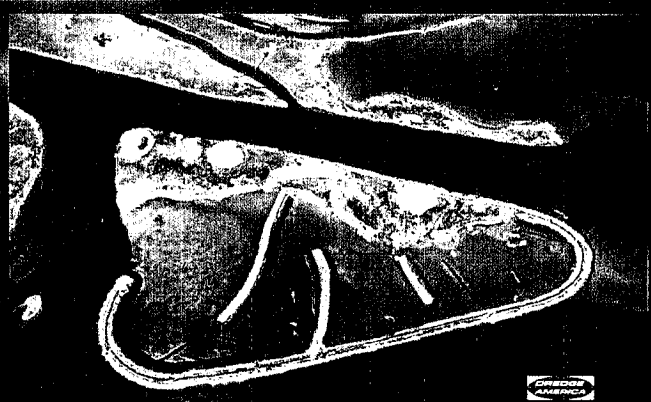
Sailfish Point- Stuart Florida

DREDGE AMERICA

Mackey Wetland – Pensacola, FL

DREDGE AMERICA

Mackey Wetland – Pensacola, FL



DREDGE AMERICA

Closer to Home

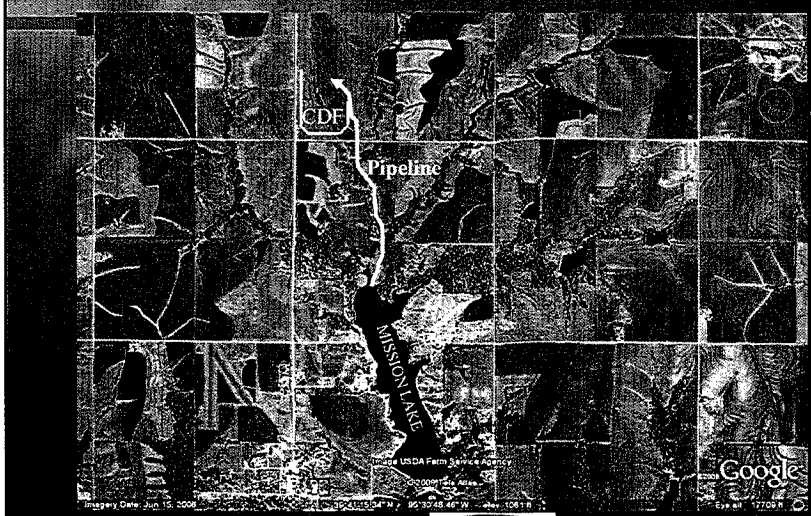
Mission Lake Restoration
Horton, Kansas

DREDGE AMERICA

Mission Lake Restoration

- Sedimentation Caused
  - Water Quality Degradation
  - Loss of lake access and water storage capacity
- 1 Million Cubic Yards Dredged
- 56 Acre Confined Disposal Facility (CDF) purchased by City
- 10,000 feet of pipe
- Startup Fall 2009 – Finished Late Summer 2010
- Dredged around the clock- Shut down Dec-8th 2009 through April 1st 2010 – Lake Frozen.

Mission Lake Dredge Area and the CDF



Before and After Depths

DREDGE AMERICA

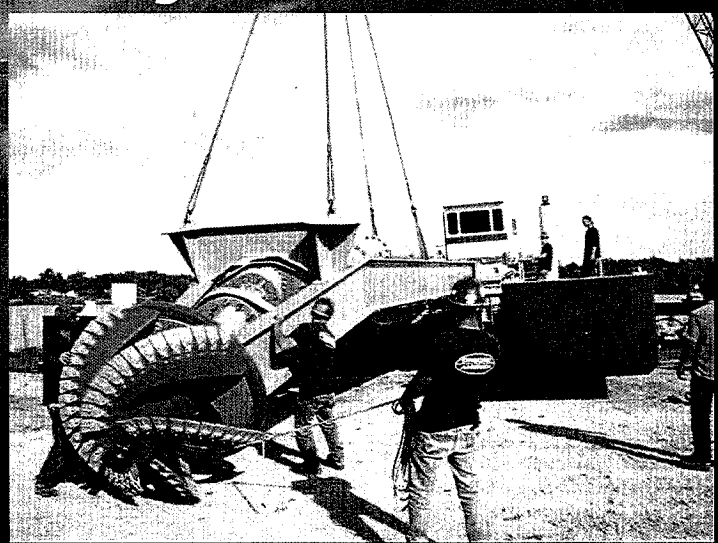
Surveying Before, During, and After Project

DREDGE AMERICA

Cutterhead Hydraulic Dredge Used for Dredging Lake

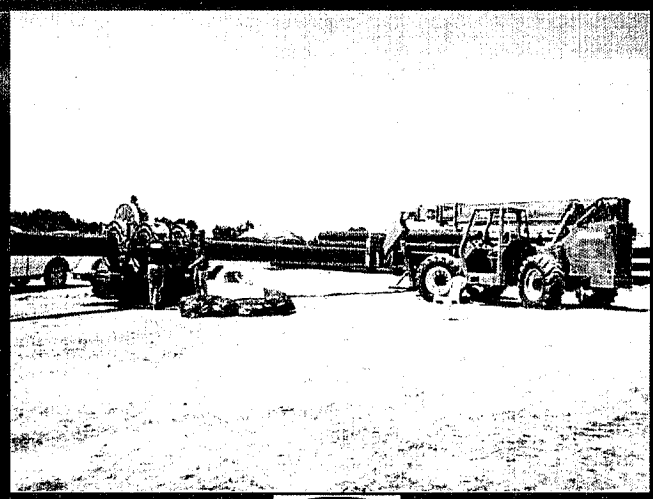
DREDGE AMERICA

Dredge Cutterhead



DREDGE AMERICA

Heat Fusing Pipe



DREDGE AMERICA

Completed Fusion

DREDGE AMERICA

HDPE Dredge Pipe from Dredge to CDF- 30" dia.

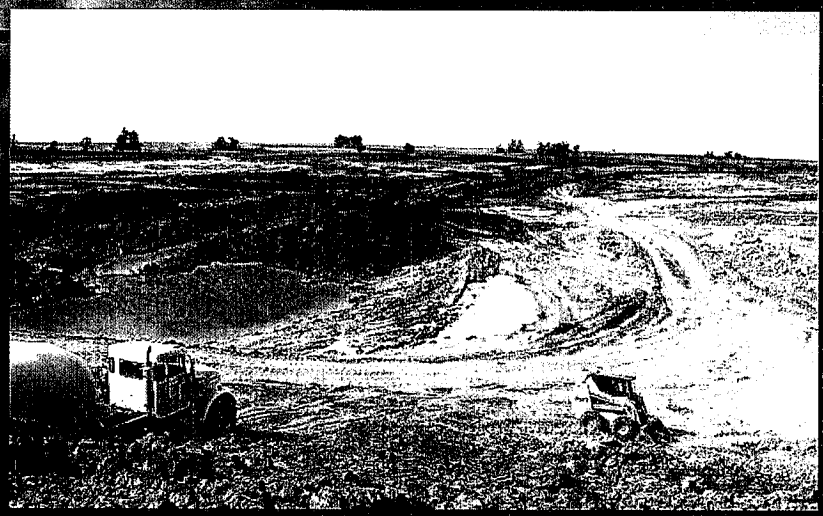
DREDGE AMERICA

CDF Dam

DREDGE AMERICA

CDF Dam Construction

56.5′ High, 672 ac-ft storage



OREGON AMERICA

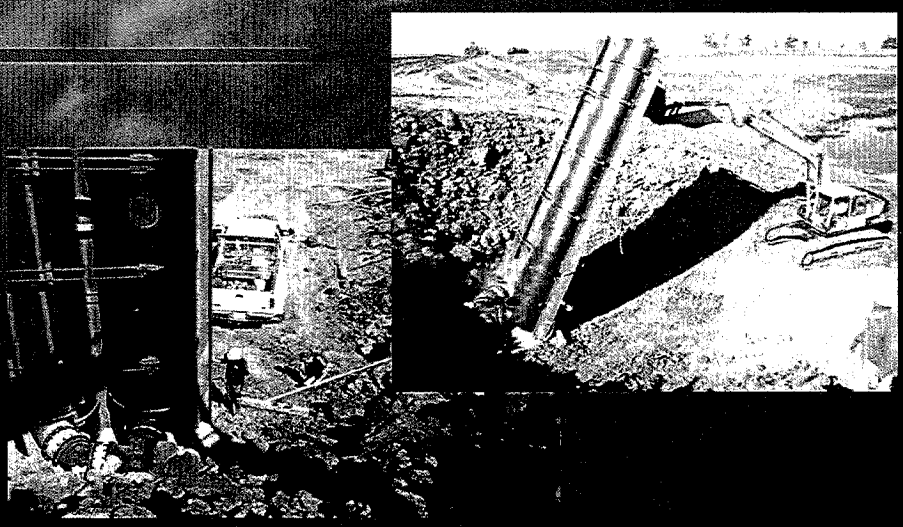
Chimney Drain Seepage Control

OREGON AMERICA

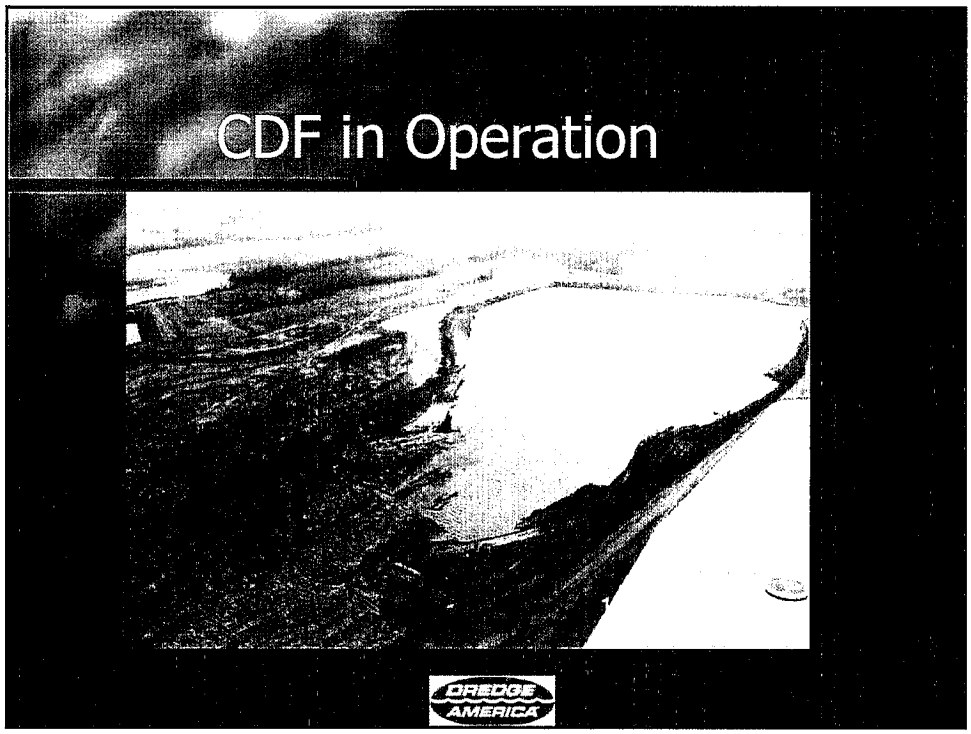
Flashboard Riser Under Construction

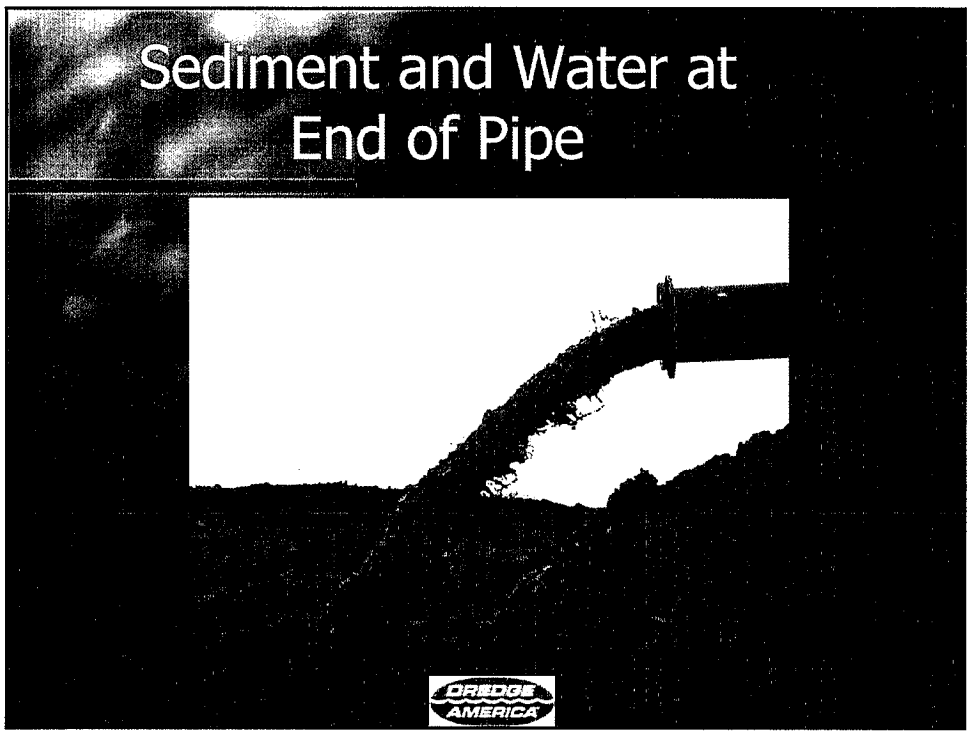
DREDGE AMERICA

CDF Flashboard Riser



DREDGE AMERICA

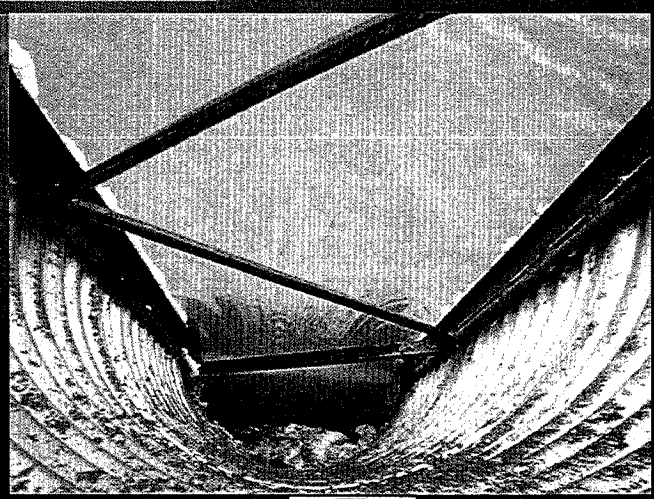

CDF in Operation
DREDGE AMERICA

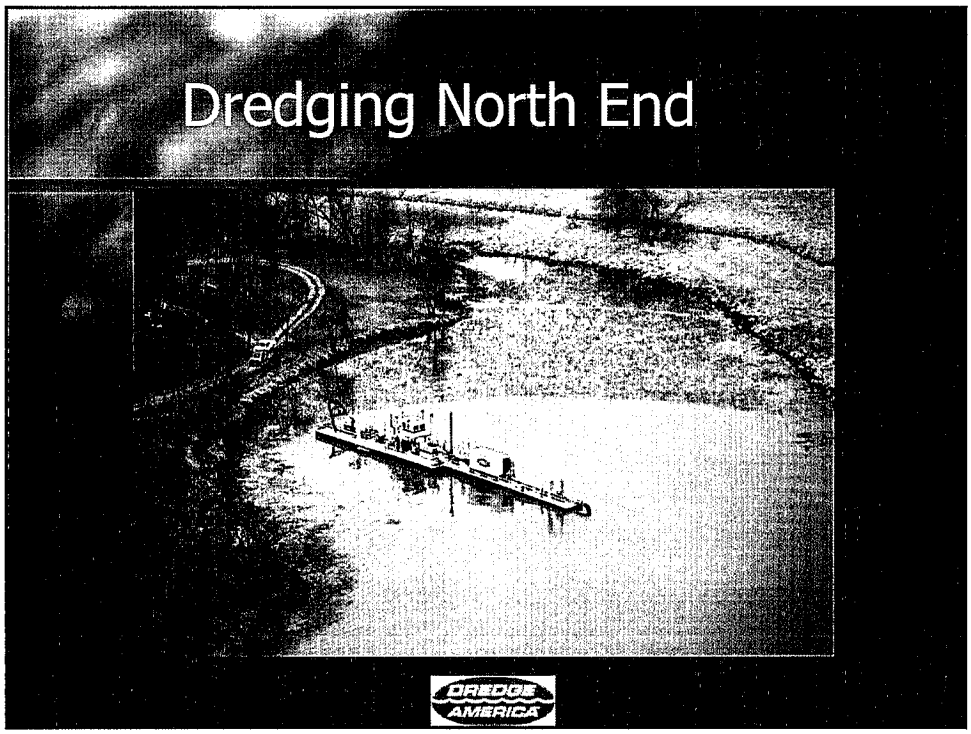

Sediment and Water at End of Pipe
DREDGE AMERICA

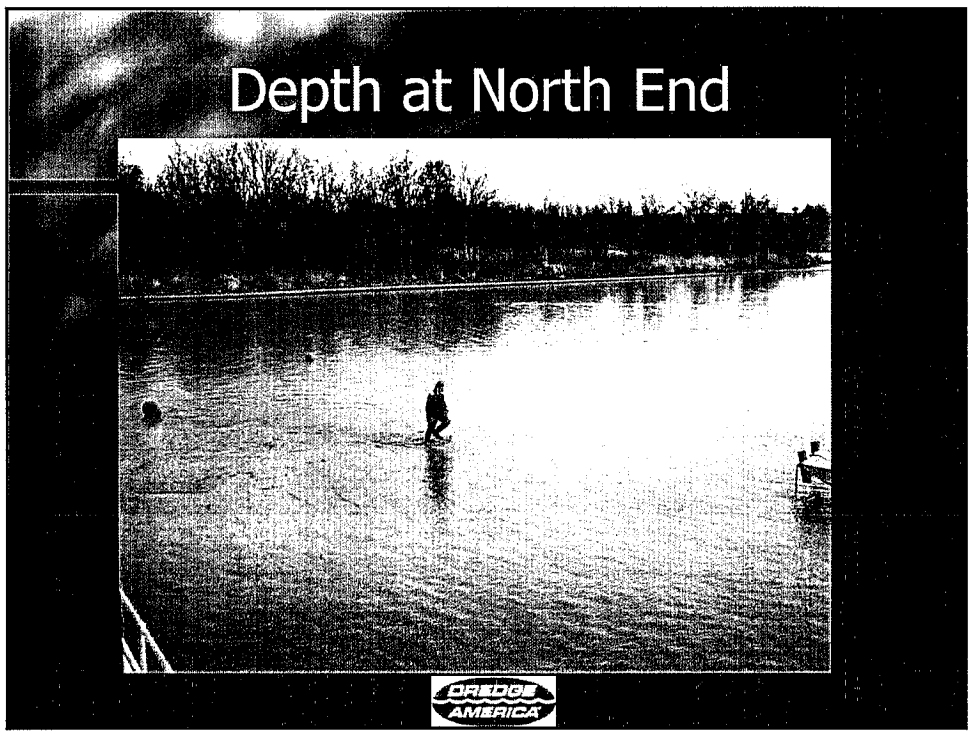
Sediment Settling in CDF

Flashboard Riser Weir

Clean water flows out top, sediment stays on bottom.



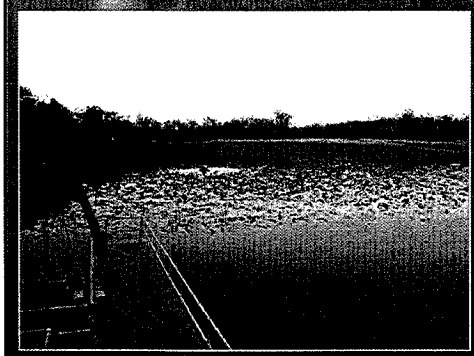

Dredging North End
DREDGE AMERICA


Depth at North End
DREDGE AMERICA

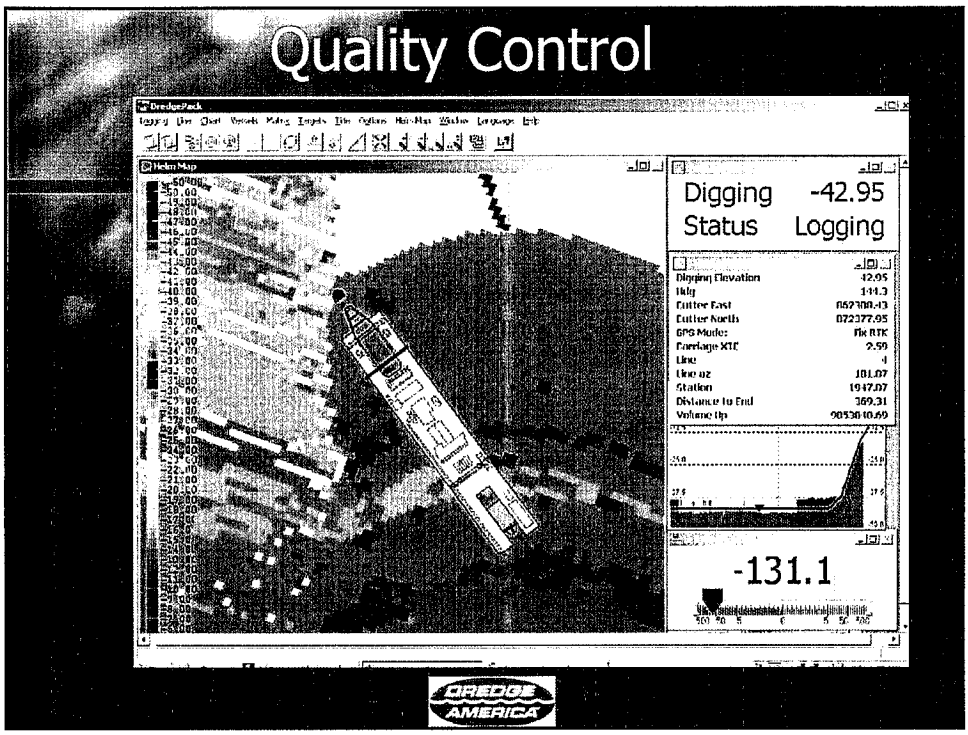
Dredging Underway

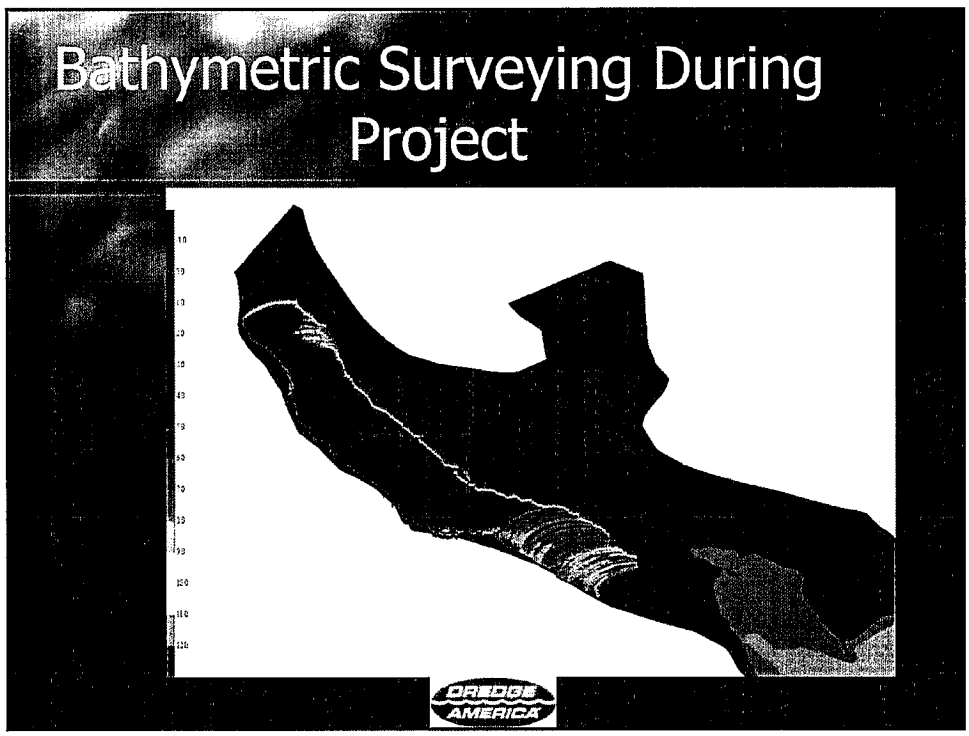
DREDGE AMERICA

North End Before and After



DREDGE AMERICA


Quality Control
Digging -42.95
Status Logging
-131.1
DREDGE AMERICA


Bathymetric Surveying During Project
DREDGE AMERICA

Mission Lake Team Effort

State of Kansas

City of Horton

Considerations for Dredging vs. New Lakes- Apples and Oranges

- If you only consider acre-feet of water capacity, new lake may be cheaper as a result of less cubic yards moved (to create dam) vs volume of acre-feet gained.
- Abandon existing lakes?

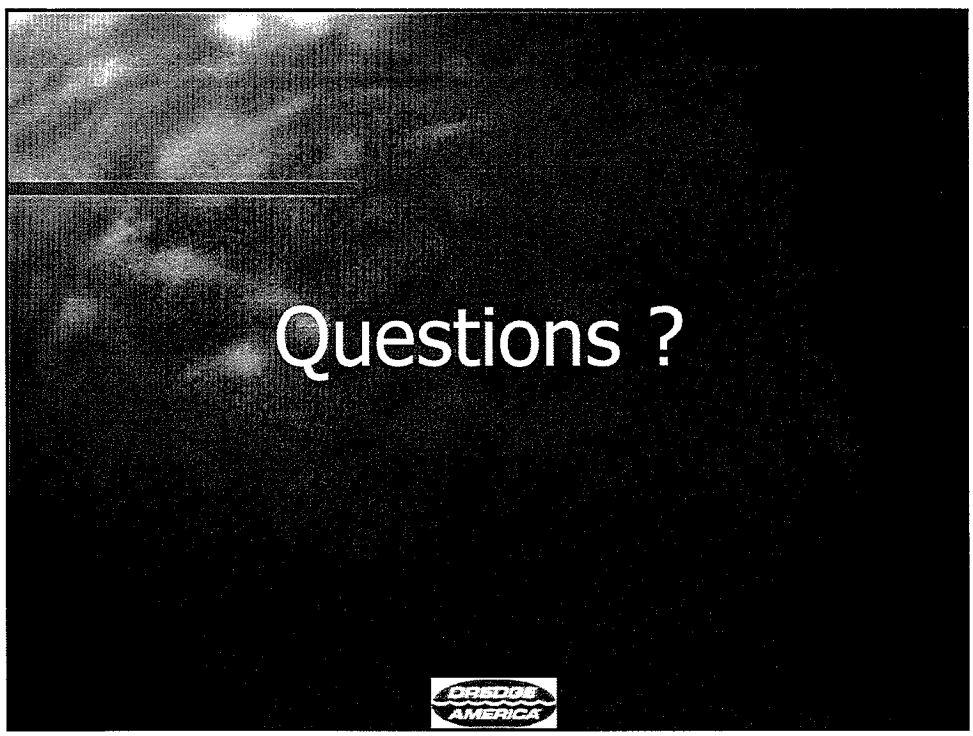
Considerations continued

- Taking farm ground out of production
- Costs of new real estate
- Impact on the local economy – Many communities and small businesses have been built around the lake
- Potential water rights issues?
- New lakes most likely much longer to engineer and permit and potentially much more controversial.

Design Build/Best Value

- Will get the projects done years ahead of schedule
- Will be the most cost effective
- Entire Mission Lake project was completed in much less time than it took to study the project.
- Having one or two major projects every year and or larger projects will bring costs down.
- Mission Lake was just over $5.00/CY for everything. (202,000,000 gal of water capacity added) (620 acre-feet)

For more information
www.dredgeamerica.com


Questions ?

STATE OF TEXAS WATER PLANNING

October 2010 | Weir Labatt III, TWDB Board Member
Western States Water Council, Chairman

TEXAS WATER DEVELOPMENT BOARD

Agency Vision

Sustainable, affordable, quality water for Texans, our economy, and our environment

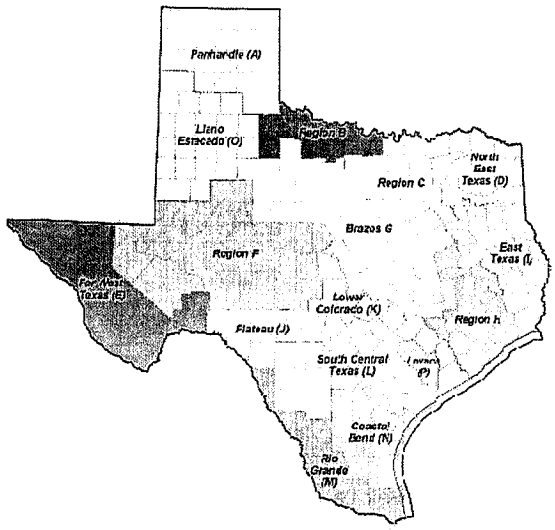
Agency Mission

To provide leadership, planning, financial assistance, information, and education for the conservation and responsible development of water for Texas

2

JOINT COMMITTEE ON ENERGY AND ENVIRONMENTAL POLICY
DATE: 10/7/10
ATTACHMENT 10

REGIONAL WATER PLANNING



Eleven interests:

- Public
- Counties
- Municipalities
- Industries
- Agriculture
- Environment
- Small businesses
- Electric-generating utilities
- River authorities
- Water districts
- Water utilities

3

REGIONAL WATER PLANNING

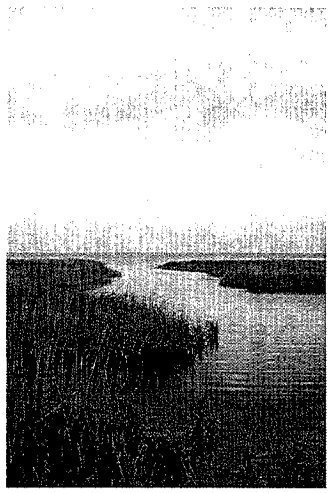
Process:

- Project future population and water demand
- Quantify existing and future water supplies
- Identify surpluses and needs
- Evaluate and recommend water management strategies
- Make policy recommendations
- Adopt the plan

4

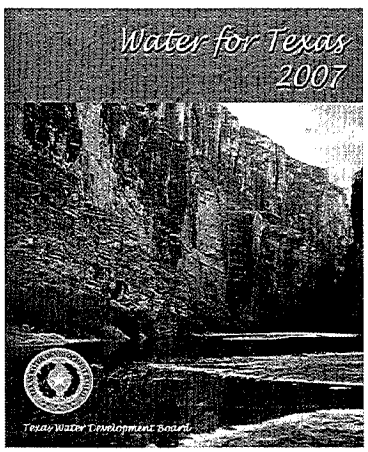
WATER MANAGEMENT STRATEGIES

- Conservation
- Reuse of wastewater
- New supply development (surface or groundwater)
- Desalination
- Improved management of existing supplies
- Other measures



5

TEXAS STATE WATER PLAN



TWDB's role :

- Review regional water plans in accordance with agency rules and guidelines; resolve interregional conflicts
- Board approval of regional water plans
- Develop State Water Plan every 5 years
- Provide funding for strategy implementation

6

TEXAS STATE WATER PLAN

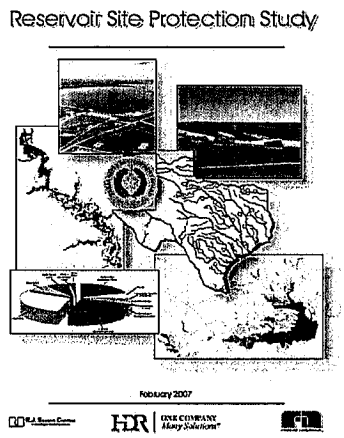
Under drought conditions, we are on a collision course.

By 2060, Texas will have:

- 18% less water
- Twice as many people
- Need for additional 8.9 million acre-feet

7

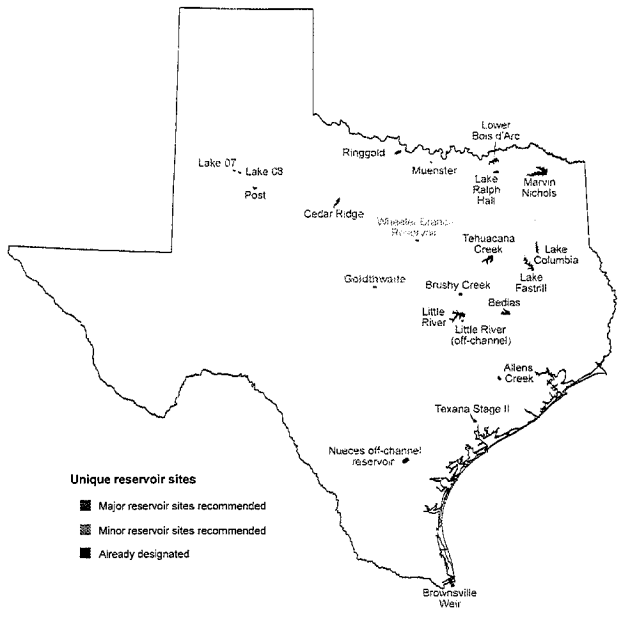
RESERVOIR SITE PROTECTION STUDY



Examined the most promising reservoir sites to determine the most appropriate sites for state protection and/or acquisition.

8

DESIGNATED UNIQUE RESERVOIR SITES



9

TWDB FINANCIAL ASSISTANCE PROGRAMS

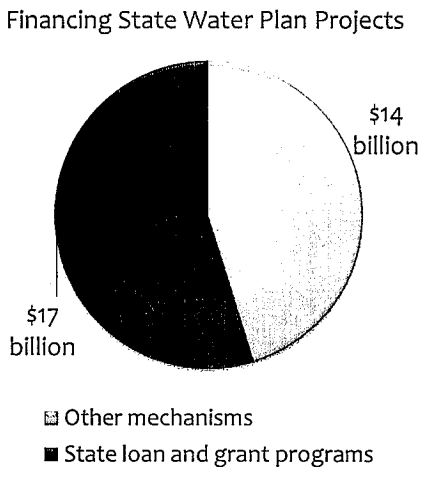
- **Storage Acquisition:** Funds design, acquisition, lease, construction, development, or enlargement in whole or part of any existing or proposed water storage project.
- **State Participation:** Enables TWDB to assume temporary ownership in a regional project when the local sponsors are unable to assume debt for the optimally sized facility; allows for the "right sizing" of projects in consideration of future growth.
- **Water Infrastructure Program:** Funds planning, design and construction of State Water Plan projects.
- **Economically Disadvantaged Areas Program:** Funds planning, acquisition, design and construction of projects in economically distressed areas where the median household income is not greater than 75% of the median state household income.

10

STATUS OF STATE WATER PLAN & FUNDING

Cost of State Water Plan

- $31 billion to implement
- Project sponsors need access to $17 billion of project capital costs through state assistance

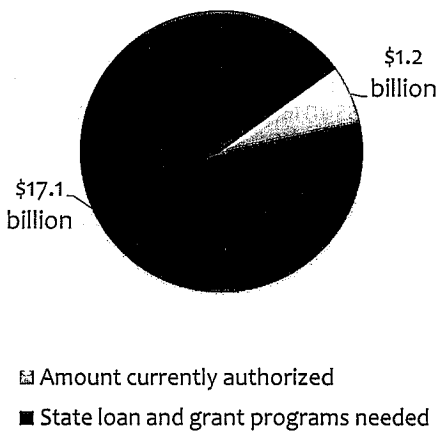


11

STATUS OF STATE WATER PLAN & FUNDING

Current Funding for State Water Plan

For 2008 through 2011, Legislature authorized $145 million for debt service to issue $1.2 billion in bonds to fund water infrastructure loans and grants for State Water Plan projects.



12

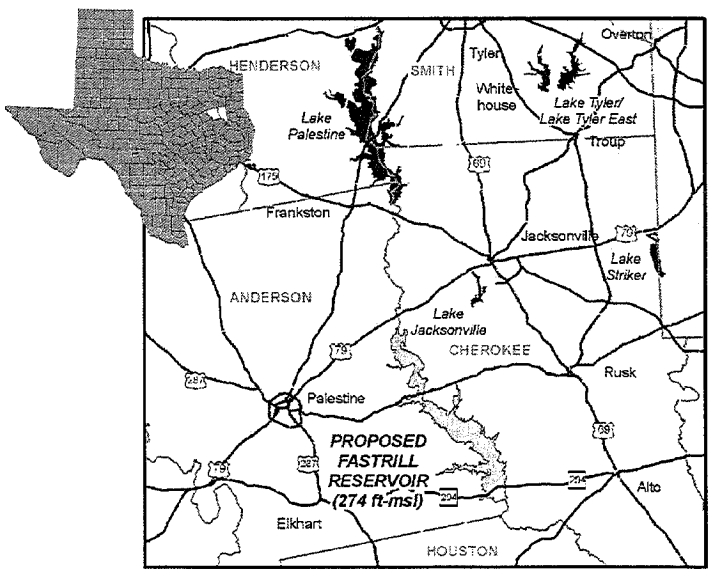
CURRENT FUNDING FOR STATE WATER PLAN

Program	Authorized in 80th Legislature FY08	FY09	Total
State Participation	55,818,750	220,252,500	**276,071,250**
Econmically Disadvantaged Areas Program (EDAP)	9,784,125	18,174,000	**27,958,125**
EDAP Rural	3,327,188	6,166,875	**9,494,063**
Water Infrastructure Fund (WIF) Subsidized	69,561,375	208,596,375	**278,157,750**
WIF 10-year deferred	80,798,250	80,803,125	**161,601,375**
WIF Rural	3,327,188	6,166,875	**9,494,063**
Total	**222,616,876**	**540,159,750**	**762,776,626**

Program	Authorized in 81st Legislature FY10	FY11	Total
State Participation	175,050,000	25,000,000	**200,050,000**
Econmically Disadvantaged Areas Program (EDAP)	14,875,000	7,500,000	**22,375,000**
EDAP Rural	10,745,000	1,250,000	**11,995,000**
Water Infrastructure Fund (WIF) Subsidized	258,365,000	162,500,000	**420,865,000**
WIF 10-year deferred	25,000,000	25,000,000	**50,000,000**
WIF Rural	1,250,000	1,250,000	**2,500,000**
Total	**485,285,000**	**222,500,000**	**707,785,000**

13

CHALLENGES: FASTRILL RESERVOIR



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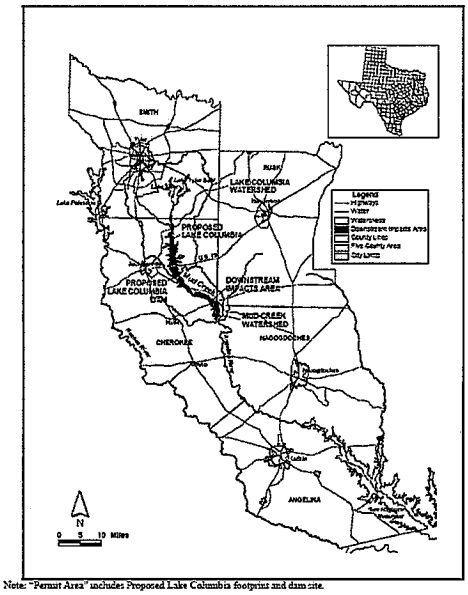
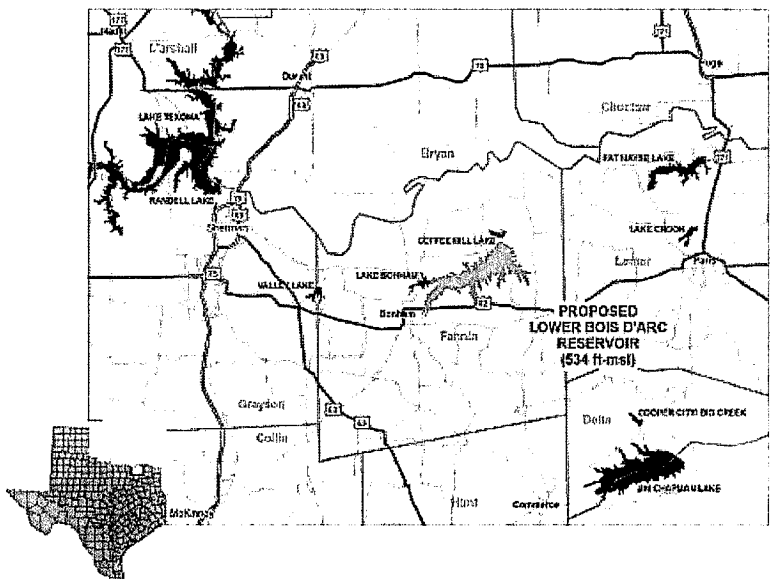
CHALLENGES: LAKE COLUMBIA



Note: "Permit Area" includes Proposed Lake Columbia footprint and dam site.

15

SUCCESSES: LOWER BOIS D'ARC RESERVOIR



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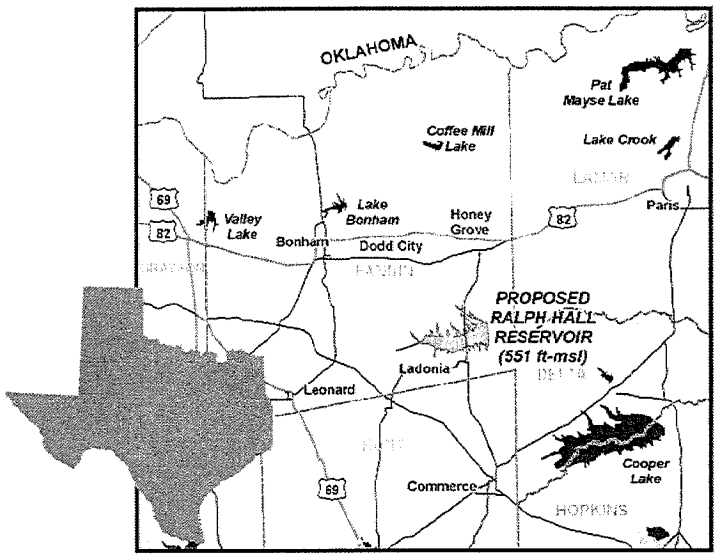
SUCCESSES: LAKE RALPH HALL



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DRAFT

KCP&L Water Challenges

Presented to

Joint Committee on Energy and Environmental Policy

Paul M. Ling
KCP&L
Manager of Environmental Services

October 7, 2010

KCP&L

KCP&L's Customers, Generating Capacity and Fuel Mix

Customers

KCP&L, an electric utility, serves over 820,000 customers located in western Missouri and eastern Kansas. Customers include approximately 722,000 residences, 96,000 commercial firms, and 2,800 industrials, municipalities and other electric utilities.

Missouri and Kansas jurisdictional retail revenues averaged approximately 70% and 30%, respectively, of electric utility's total retail revenues since the July 14, 2008, acquisition of GMO.

Generating Capacity

Electric utility has approximately 6,100 MWs of generating capacity. As part of KCP&L's Comprehensive Energy Plan, Iatan No. 2, a coal-fired plant, will add approximately 620 MW (electric utility's share) to electric utility's generating capacity.

Fuel Mix based on generation

- Coal - 76%
- Nuclear - 18%
- Coal and natural gas - 1%
- Natural gas and oil - 3%
- Wind - 2%

KCP&L

JOINT COMMITTEE ON ENERGY AND ENVIRONMENTAL POLICY
DATE: 10/7/10
ATTACHMENT 11

DR

KCP&L's La Cygne Generating Station Water Usage

Breakdown of Existing Station Water Use

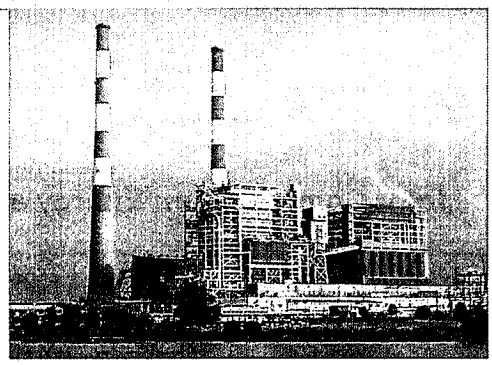
- Service Water
- Process Water
- Material Handling
- Cooling Water

Total Reported Water Consumption to DWR in 2009:

- 2,535,383,000 gallons

Total Estimated Cooling Water:

- 286,525,000,000 gallons per year



Future Station Water Use

Service Water:

- Proposed Wet Scrubber Replacement on Unit 1 and addition on Unit 2.

Cooling Water:

- Replacement of once through cooling with closed cycle cooling with cooling towers.

KCP&L

KCP&L's La Cygne Generating Station Water Supply

File No. 15,181 – Natural flows of North Sugar Creek for industrial use at the La Cygne Generating Station with an annual storage quantity in La Cygne Lake. Annual quantity allowed is 40,000 acre-feet.

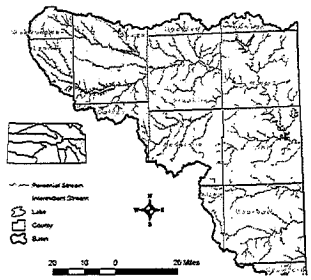
File No. 15,179 – Natural flows of the Marais des Cygne River for industrial use at the La Cygne Generating Station with an annual diversion quantity. Annual quantity allowed is 33,697 acre-feet.

KCP&L

KCP&L's La Cygne Station Water Assurance District

Additional Station Water Assurance

- ❑ Water assurance district created to provide municipal and industrial users downstream from federal reservoirs another way to obtain water supplies.
- ❑ Water assurance district enhances municipal and industrial water rights by enabling river water to be stored for later use pursuant to existing water rights.
- ❑ KCP&L has water reservation rights in Melvern and Pomona Reservoirs.



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KCP&L

KCP&L's Peaking Units Future Water Usage

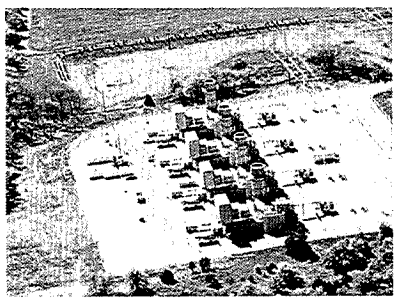
Additional Peaking Water Use

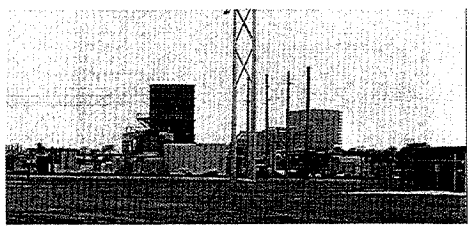
Potential Inlet Cooling on Combustion Turbines:

- ❑ Service Water

Potential Conversion of Simple Cycle Peaking Units to Combined Cycle:

- ❑ Cooling Water
- ❑ Process Water





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KCP&L

DR

Water Issues – Future Regulations

Clean Water Act Section 316(b)

- Concern over "impingement" (trapping organisms against screens) and "entrainment" (passing organisms through the cooling system) of aquatic life.
- EPA is revising its cooling water intake structure rule under Clean Water Act section 316(b) for existing steam-electric power plants.
- EPA appears likely to propose a revised rule that will require many existing once-through plants to retrofit cooling towers.
- Environmental, energy, rate, and reliability impacts.
- EPA plans to propose a revised rulemaking by February 2011 and finalize a rule by July 2012.
- Debate: one-size-fits-all vs. flexible site-specific technology requirements.
- Need for cost-benefit balancing crucial.

Effluent Guidelines

- EPA completed a multi-year study of the Steam Electric Power Generating industry.
- EPA's decision to revise the current effluent guidelines appears to be driven by new air pollution controls equipment concerns.
- Effluent guidelines (i.e., effluent limitations guidelines and standards) are developed pursuant to the Clean Water Act and applied to industrial discharges.
- Information collection request consisted of multiple sections which have been tailored to address specific processes, data needs, for certain types of power plants.
- Additional sections collected economic data and technical information on scrubber wastewater, ash handling, metal cleaning operations, wastewater treatment, surface impoundment and landfill operations.

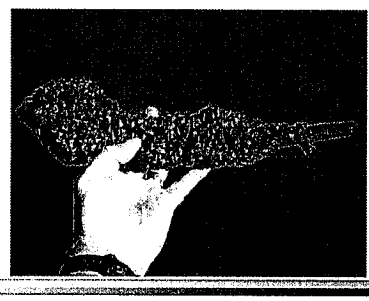
KCP&L

Water Issues - Aquatic Nuisance Species

Zebra mussels

- Can cause fouling, which would force plants to use more anti-fouling measures.
- Can cause large algae blooms.
- Have infected several lakes in Kansas and Missouri and the rivers flowing out of them.

Picture of Zebra Mussels on a stick from USF&W



KCP&L

Questions

Thank You

Paul.Ling@KCPL.com

KCP&L

Presentation to Joint Energy & Environment Committee

SUNFLOWER ELECTRIC POWER CORPORATION
A Tradestone Energy® Cooperative
...energy done right

Power Plant Design Considerations

When building a generating facility, there are numerous complex factors to evaluate. Some examples of major variables influencing power plant design choices include:

- Fuel
- Water
- Transmission
- Construction costs
- Operating and maintenance costs
- System needs
- Fit with existing system assets
- Regulatory requirements
- Market rules

JOINT COMMITTEE ON ENERGY AND ENVIRONMENTAL POLICY
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ATTACHMENT 12

Why Use Water?

- Power Cycle Water Use (Rankine cycle)
  - Closed-loop system
  - Water re-cycled constantly
  - Small losses (low water use)
- Cooling Systems
  - Generates most of the visible vapor from a power plant
  - Result of waste heat that could not be converted to useful work
  - Largest water consumption in the power cycle
- Water is the Fluid of Choice
  - Non-toxic and relative unreactive chemically
  - Relative abundance
  - Low cost
  - Attractive thermodynamic properties

Choices and Tradeoffs

- Dry Cooling
  - Dry cooling systems cost approximately 20% to 25% more than traditional wet systems.
  - Require higher plant "parasitic" loads (i.e., more station power) to operate as compared to traditional wet systems.
  - Dry systems are more complex and more prone to air leakage requiring higher costs to maintain the cooling system.
  - Higher main turbine backpressure results in lower output and lower efficiency as compared to traditional wet cooling systems.
  - Dry cooling systems result in significantly lower overall unit thermal efficiencies requiring greater fuel consumption for the same electric output.
  - The lower efficiencies and higher fuel consumption results in greater emissions including greater carbon emissions as compared to traditional wet-cooled designs.

Sunflower Experience

- Natural gas fleet entered service in 1960s and 1970s
  - Four steam units ranging in size from 58 MW to 145 MW
  - Typically requires 1,000 gallons per MWh of net electric production
  - Consumption directly influenced by initial water quality
- Coal-fired unit entered service in 1983
  - 360-MW unit with a dry scrubber and fabric filter
  - Typically requires 500 gallons per MWh of net electric production
  - Zero-discharge designed water system
  - Wastewater is captured in basins and processed for reuse

Water Sources and Usage

- Groundwater wells supply all Sunflower generation facilities.
  - Alluvial formation
  - Ogallala formation
  - Dakota formation
  - Sunflower does not have any surface water rights
- Water usage is a direct function of power produced.
  - Holcomb unit is the only base load resource
  - Typical H1 annual water consumption: 4,100 acre feet
  - Gas-fired unit production is highly variable; so, water usage is variable

Regulatory Risks

- Potential Impact of EPA 316(b) Rules
  - No impact to Sunflower resources
  - Sunflower's water needs are supplied via groundwater
  - Sunflower has no surface water intakes anywhere within our system
- Potential Impact of Proposed EPA Rules (Steam Electric Power Generating Effluent Guideline Limitations and Standards)
  - Premature to speculate regarding potential impacts
  - Sunflower received a data request from EPA to complete a complex nine part questionnaire for three of six generation facilities (Holcomb Station, Ft. Dodge Station and Garden City Station)
  - The data request information was submitted to EPA in September 2010
  - Current rules were last updated in 1982
  - It make take several more years for this effort to result in final rules

Adequacy of Supply

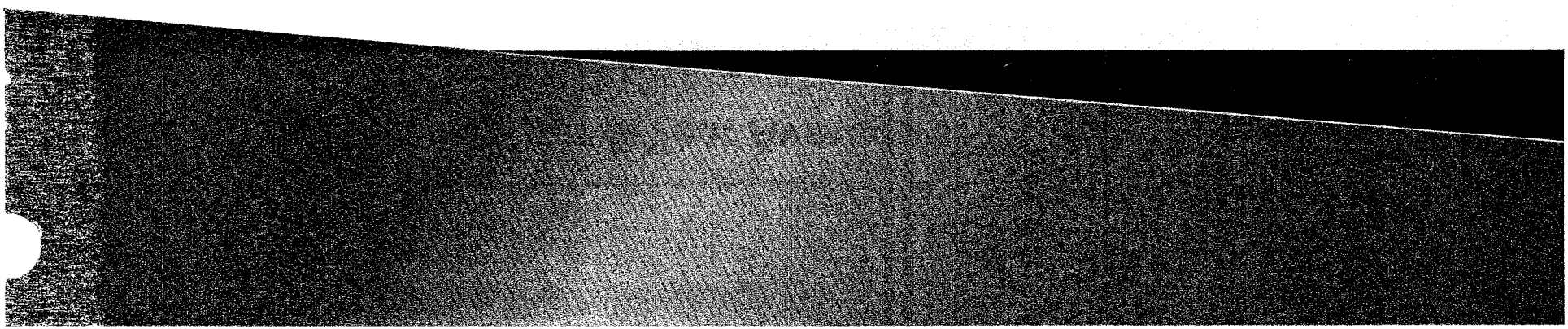
- Groundwater Studies
  - Public and private studies have indicated adequate water supplies well beyond the useful life of all assets
- Holcomb Expansion Water Supply
  - Project participants have purchased existing agricultural water rights
  - Conversions of agricultural water rights to industrial rights result in a 40% reduction in quantity as compared to existing agricultural water rights
  - Power plant use profile is continuous verses high volume, short duration profile of current agricultural users
  - Power water use profile combined with conversion reduction lowers hydraulic stress on the aquifer
  - Worst case analysis indicated an economic water supply for H2 at least twice the length of the useful life of the unit

JOINT COMMITTEE ON ENERGY ANL
ENVIRONMENTAL POLICY
DATE: 10/7/10
ATTACHMENT 13

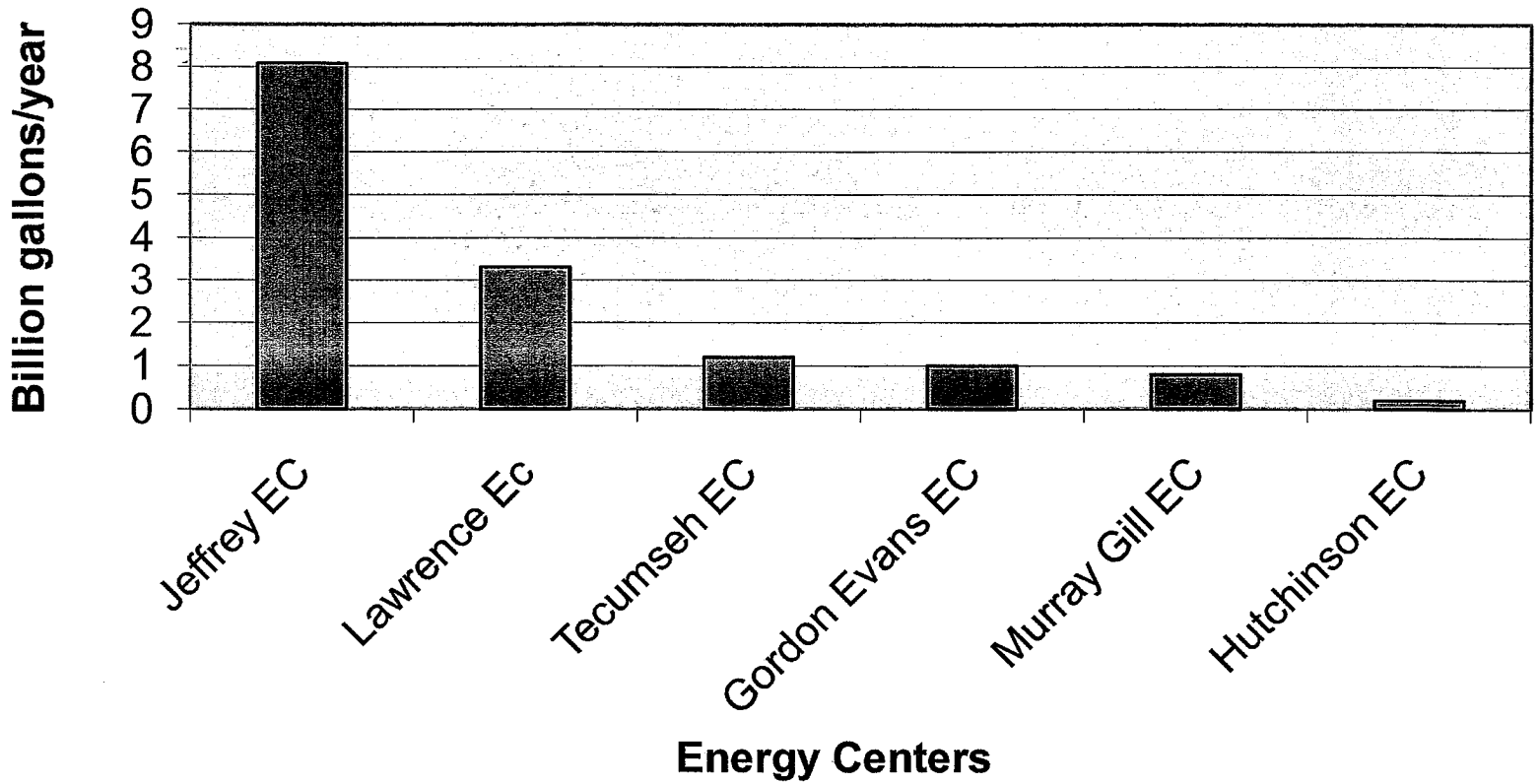
Water Usage and Regulation Impacts on Electric Generation

presented by Westar Energy
before the
Joint Committee On Energy and Environmental Policy

October 7, 2010



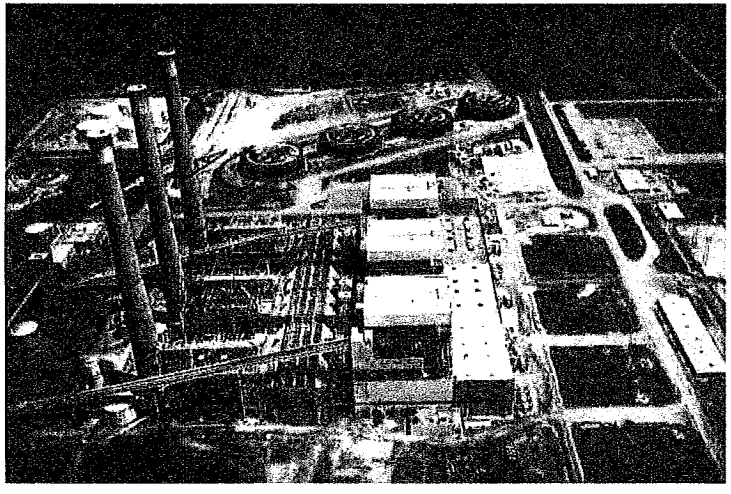
Energy Center 5-Year Average Water Use



How much do we use

Coal Unit w/cooling tower "Rules of Thumb" on water use:

- 90/10 split between cooling and boiler makeup
- 500-600 gallons per MWH production



Jeffrey Energy Center

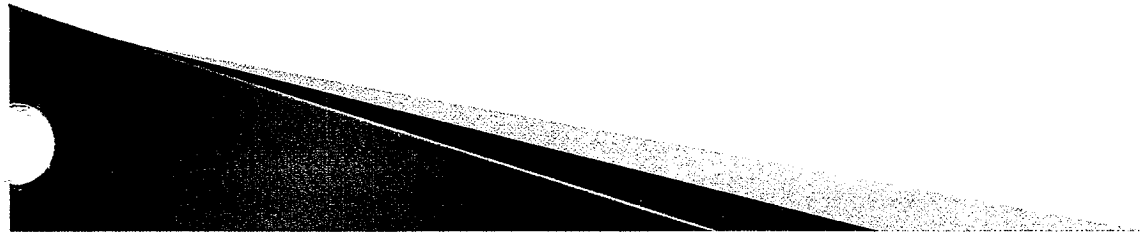
2160 MW Capacity

15,000,000 MWHrs per year

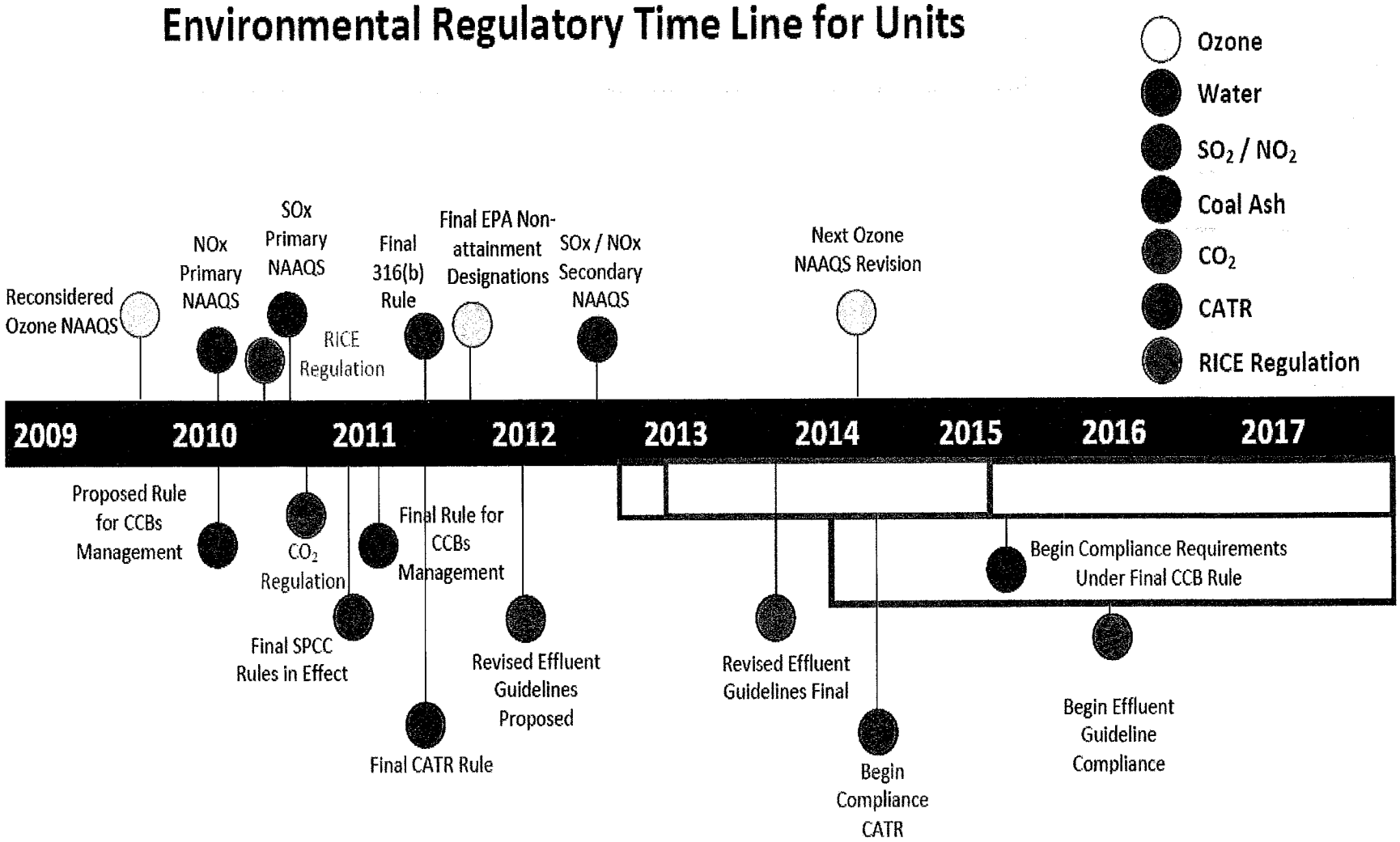
~8 billion gallons

Future Water Issues

- Demand is growing.
- Availability is diminishing.
- Interstate/regional disputes.



Environmental Regulatory Time Line for Units



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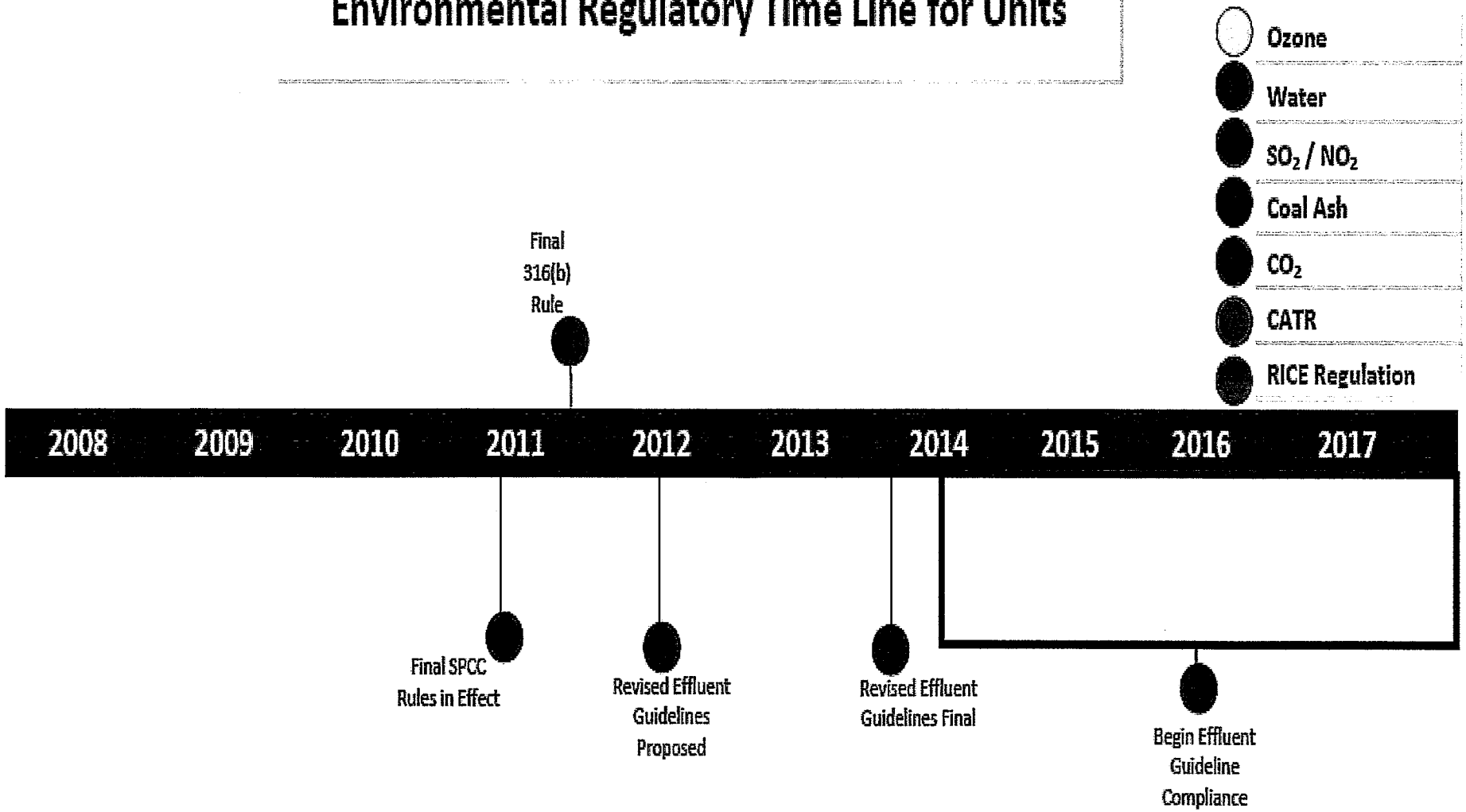
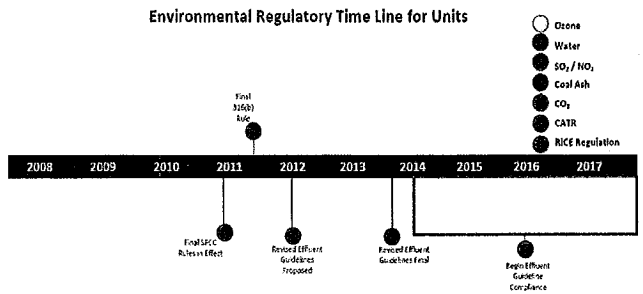
Environmental Regulatory Time Line for Units



Utility Water Concerns

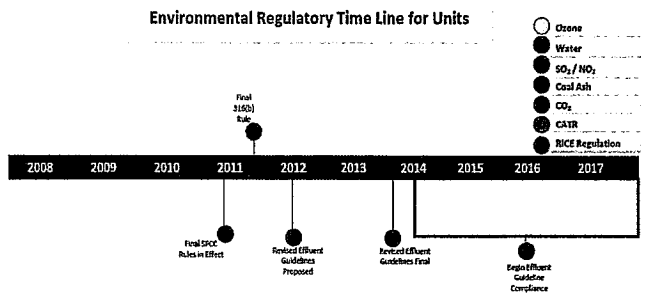
13-7

- 316 (b)
  - Westar-operated fleet has cooling towers;
  - Expect limited impacts on generation fleet;
  - Wolf Creek believes they meet current standard.



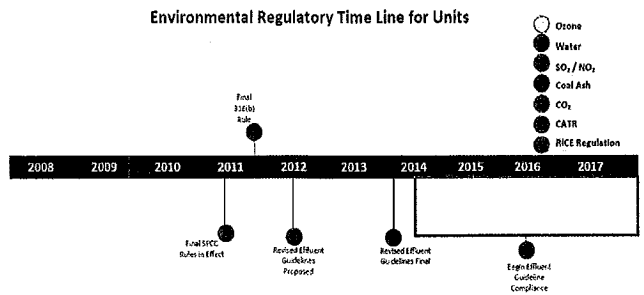
Utility Water Concerns

- Waters of the United States
  - Understanding remains in flux.
  - According to EPA:
    - How to determine the reach of "Traditionally Navigable Waters";
    - Clarifies the regulatory term "adjacent wetland";
    - Refines the concept of relevant reach.



Utility Water Concerns

- Power Plant Water Discharges
  - Update to the effluent guidelines in 2013;
  - Recognition of pollutant migration from air to water;
  - Technologies to reduce water pollutants;
  - Coal combustion waste handling with water reduced or eliminated;
  - Expect lower discharge limits on discharge permits.



Kansas City
Board of Public Utilities 540 MINNESOTA AVENUE • KANSAS CITY, KANSAS 66101 • (913) 573-9000

IMPACT OF WATER ON ENERGY GENERATION

presented to:
State of Kansas
Joint Committee on Energy and Environmental Policy Meeting
3:30 p.m. Thursday, October 7, 2010
Kansas Statehouse Room 152-S

by:
Joe Dick
Kansas City Board of Public Utilities

The Kansas City Kansas Board of Public Utilities (BPU) is the largest municipally owned utility in the state of Kansas. BPU serves 65,000 electric customers and 55,000 water customers in Wyandotte County and has contracts for wholesale power customers. BPU facilities consist of 3 power stations, Nearman Creek Power Station, Quindaro Power Station and Kaw Power Station (currently inactive).

Thank you for the opportunity to provide a response to several important questions that this Committee is studying regarding water usage/conservation and the electric power generation process.

1. **Water usage and conservation measures as part of a review of the water-energy nexus."**

Cooling water is essential to the power production process at the three electric generating stations operated by the Kansas City Board of Public Utilities (*aka:* BPU) in Wyandotte County, Kansas.

2. Where your utility currently gets the water used to generate electricity.

BPU has surface water intakes on the Missouri River at its Nearman Creek and Quindaro Power Stations. There is also an intake on the Kansas River at its Kaw Power Station. However, the Kaw Station is currently in "Long-Term Cold Storage".

When surface water is not available, BPU uses a cooling tower for power production. The source of water for the cooling tower is potable water from BPU's Nearman Water Treatment Facility. The source of water supply for the Nearman Water Treatment Plant is two 40 million gallon per day horizontal collector wells which draw water from the aquifer 100 feet below the Missouri River. Potable water is also used for power production at the Quindaro Power Station.

3. **How much water is used in a year.**

The amount of cooling water used in the power production process varies widely and is greatly dependant on ambient air temperatures, river water temperatures, and energy demands on the power stations. During 2009, Nearman used about 17.8 billion gallons and Quindaro used 46.8 billion gallons of river water. BPU water intakes drew in a combined total of more than 64.6 billion gallons of water from the Missouri River during 2009.

JOINT COMMITTEE ON ENERGY AND ENVIRONMENTAL POLICY
DATE: 10/7/10

ATTACHMENT 14

4. The adequacy of water supply going forward 10 – 20 years.

An abundant source of river water is crucial to plant operations. River water is a cost-efficient, dependable, and plentiful natural resource that helps keep electricity costs low.

The long-term adequacy of river water at our intakes is now uncertain at best. Especially during drought conditions, diminished releases from the Corp's upstream dams on the Missouri River have severely limited the water flow at our intakes. Also, as a result of the Missouri River cutting itself deeper and deeper into the river bed, the surface water available at our intakes is decreasing. To counteract low flows, BPU began using a variety of temporary emergency pumps at the intakes in 2000. BPU also constructed a cooling tower at the Nearman Power Station which uses water from BPU's horizontal collector well as discussed in question 2.

5. Potential effect of EPA proposed rules (316(b)) or guidelines (effluent).

Section 316(b) of the Clean Water Act concerns fish protection at cooling water intakes. The pending USEPA changes to 316(b) could require BPU to install extremely expensive retrofits at its intakes. BPU is following the issue.

Recently, BPU spent literally hundreds of man-hours responding to a long EPA Information Collection Request (ICR) regarding wastewater discharges from its power plants. Based on the information EPA will receive from all the Steam-Electric Power Plants in the United States, EPA will probably propose tighter regulations for wastewater discharges. Although the new regulations may not come out until next year, the costs to comply will undoubtedly be significant.

6. Any particular water supply issues your utility may have.

The US Army Corps of Engineers has begun a basin-wide study to determine if the congressionally-authorized water uses on the Missouri River should be modified. This "Missouri River Authorized Purposes Study" (MRAPS) is important and BPU is actively taking part in the study to ensure that water supply to our power plants remains an authorized purpose.

Also, the US Army Corps of Engineers has undertaken a basin-wide study to determine the best ways to recover habitats and protected species in the river. This "Missouri River Recovery Plan" (MRRP) could ultimately reduce the flow of river at our intakes if the Corps modifies flow releases from its upstream dams.

Collectively, Missouri River issues have added yet another level of cost and uncertainty as we try to plan for the future power needs of our community.

Thank you for the opportunity to share this information with you and I will stand for questions at the appropriate time.

Joint Committee on Energy an Environmental Policy

October 8, 2010

Madam Chairperson and members of the Committee; I am Dennis Schwartz, and I serve as chair of the Kansas Water Authority's Public Water Supply Committee. I appear before you today to discuss my experiences with the Kansas Water Authority's approach to water supply issues.

A few years ago, the Kansas Water Authority began to recognize the problem of sedimentation in our reservoir system and the impact that it could have on our drinking water supply. In particular we saw projections on when each basin in Eastern Kansas would be vulnerable during a repeat of the 1950's drought. In response, the Reservoir Sustainability Initiative was created. The effort of the Reservoir Sustainability Initiative is to raise the awareness of the issue and begin the process to address this complex topic in a coordinated fashion.

The legislature began to get involved more seriously when hearings were held in the House Vision 2020 Committee in 2009 and a report on the issue was requested. The Reservoir Roadmap report was delivered last year to the same committee. The Roadmap provides that a comprehensive approach is needed to address reservoir issues and sedimentation. There are three sections or volumes to the Roadmap: quantification of the issue statewide, statutory and budget considerations, and a basin approach to reservoir sustainability using the Neosho Basin as an example.

While Kansas has a good set of laws pertaining to reservoirs, some changes are probably needed to make them work together better and be more effective. The overall approach is that if we are going to deal with this issue, there needs to be a coordinated approach to making sure that Kansas has enough supply to meet future needs. That means that in some cases we must rethink our way of doing business. Changes to be considered such as providing 100% of the cost share for streambank projects, elimination of the need to include flood control in multipurpose small lakes, changing the lake restoration program away from a strictly cost share program to one that is led by the state, and protection of unique reservoir sites. At our upcoming Water Authority meeting, we will also be discussing broader access to state owned storage in the Lower Smoky River basin where a significant irrigation community exists. In each case, the State will need to take a more active role in protecting and developing water supply reservoirs if we are to avoid crisis.

Funding of water resource projects will always be an issue, and reservoirs are no different. A broad study of the funding needs to secure, protect and restore reservoir storage space over the next 40 years identified as much as $4 billion in needs. A portion of this funding is in current revenue streams such as water marketing revenue, the state water plan fund and federal funds. However, significant additional revenue will be needed to take on these projects. While the numbers seem daunting, it is important to remember that these reservoirs are state infrastructure. They should be treated and funded as such.

The Kansas Water Authority for 25 years has developed water plans on a basin approach. Evaluation, protection, restoration and operation of our reservoirs should proceed in the same manner. What happens in the watershed affects the reservoir, what happens in the reservoir affects those that live downstream. The State has taken a system approach to identifying problems and solutions.

JOINT COMMITTEE ON ENERGY AND ENVIRONMENTAL POLICY
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We have completed a great deal of work in the Neosho which is the basin of greatest near term concern. If the drought of 2006 would have continued, we would be looking at true water shortages now. Kansas has for 14 years sought a reallocation of water storage in John Redmond Reservoir to raise the permanent pool by two feet. This has proven far more difficult when dealing with the Corps of Engineers than originally expected.

Current actions in the Neosho include streambank stabilization and other best management practices to slow the rate of sedimentation. Slowing sedimentation through these projects must happen now while we figure out how to create more supply through dredging, building new reservoirs or importing water from another source. We are beginning to evaluate each of these options now. But planning and evaluation of these projects take time.

If there is one thing that I would like for you to take home with you today, it is that these are truly regional problems no one community or industry can deal with. The state must take an aggressive approach to avoid a water crisis. State leaders in the past provided good long range vision in establishing the system of laws and programs we have today. But as time changes, the needs of our society and our resources change too. We as leaders now must take up the responsibility to provide the next vision for our water supply future if we are to provide for those that follow.

Thank you for the opportunity to speak with you today. I will be happy to answer any questions you have at the appropriate time.

Dennis Schwartz, Chairman
Kansas Water Authority, Public Water Supply Committee

SHAWNEE COUNTY
RURAL WATER DISTRICT NUMBER 8

3260 SE TECUMSEH RD • P.O. BOX 95 • TECUMSEH, KS 66542-0095
PH 785/379-5553 • FAX 785/379-5592

October 8, 2010
Before the Joint Committee on Energy and Environmental Policy

Public water supply is a critical public service for almost all of the citizens of our state. Having managed a rural water district since 1976, I entered the profession just in time to be involved in the implementation of the Federal Safe Drinking Water Act. All water supply professionals recognize and appreciate the value of the Act, even though it has presented us with many significant challenges. The result of the Act has been that the citizens of our country enjoy some of the safest and best quality drinking water that is available anywhere in the world. We should all be quite proud and thankful that those that we trust with providing that water service have risen to the challenge of meeting the goals of the Safe Drinking Water Act.

Complying with all of the regulations requires the highest degree of professionalism, both by those whose daily job is public water supply, as well as their governing bodies that carry the ultimate responsibilities. Training and technical assistance on at least a limited basis is available to help systems meet their responsibilities. Unfortunately in many cases those services are not fully utilized and we see many cases of marginal quality governance and in some cases management of these very critical utilities.

The Kansas Rural Water Association cooperates with the Department of Health and Environment, the Kansas Water Office, and other agencies, in operating various programs funded both at the state and national levels to deliver on-site assistance and training to both water and wastewater systems. KRWA recently presented it's latest annual report to the Kansas Water Authority on its water conservation program, which continues to be a great value in assisting communities in reducing their lost or unaccounted for water.

Public water supply systems must continue to be ever vigilant to insure the reliability and safety of the service that they provide. Loss of reservoir storage either through sedimentation or climatic change dictates that we monitor and plan for our future needs. Since the last time that Kansas experienced an extended drought, we have become more and more dependent on especially our surface water resources. That trend is likely to continue. Demand management will need to play a larger role to meet the public needs if or when we are faced with extended drought conditions. Many systems do little to encourage conservation, having economic pressures to "sell" as much water as possible. I believe that ethic should change.

Invasive species is but the latest of challenges that those of us relying on surface water have had to confront. Wildlife and Parks have expended great efforts to limit the spread of zebra mussels, but their proliferation nonethe less continues. Water systems have to be proactive to be certain that their facilities are adequately protected.

Other priorities that are important to public water supply systems are contained in and will continue to evolve through the State Water Planning process.

Respectfully submitted by Dennis F. Schwartz, General Manager

Dennis F. Schwartz

JOINT COMMITTEE ON ENERGY AND ENVIRONMENTAL POLICY
DATE: 10/8/10
ATTACHMENT 16

Public Water Supply Issues in Johnson County

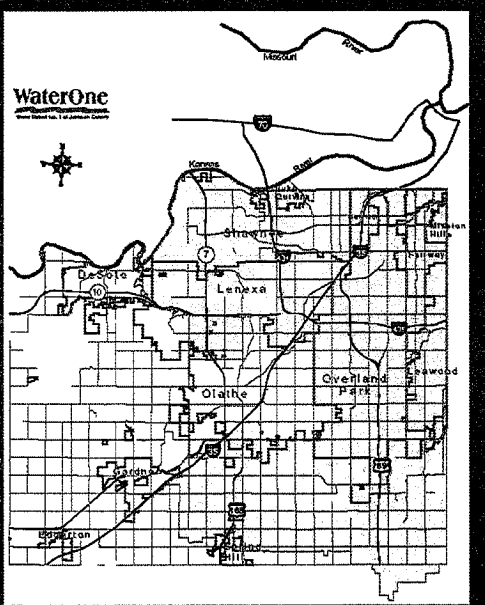
Joint Committee on Energy and Environmental Policy

October 8, 2010

Presented by: Mike Armstrong
General Manager
WaterOne

Who Is WaterOne?

- Serves 16 Cities in Johnson County
- Approximately 400,000 customers
- 138,000 service connections
- Treatment Capacity 200 Million Gallons per Day (MGD)
- 130 MGD from Missouri River
- 70 MGD from Kansas River



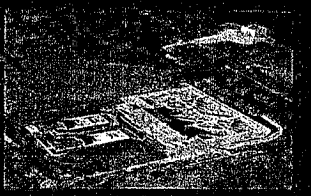
JOINT COMMITTEE ON ENERGY AND ENVIRONMENTAL POLICY
DATE: 10/8/10
ATTACHMENT 17

WaterOne's Major Facilities

- Kansas River Intake

- Horizontal Collector Well

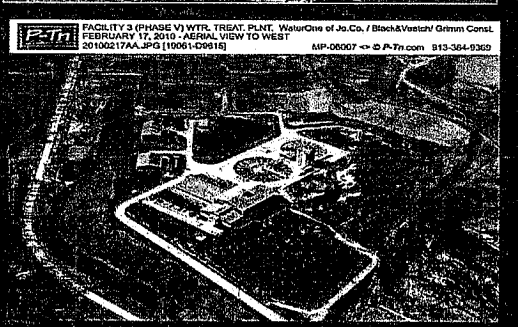
- Missouri River Intake



WaterOne's Major Facilities

- Hansen Treatment Facility

- Wolcott Treatment Facility



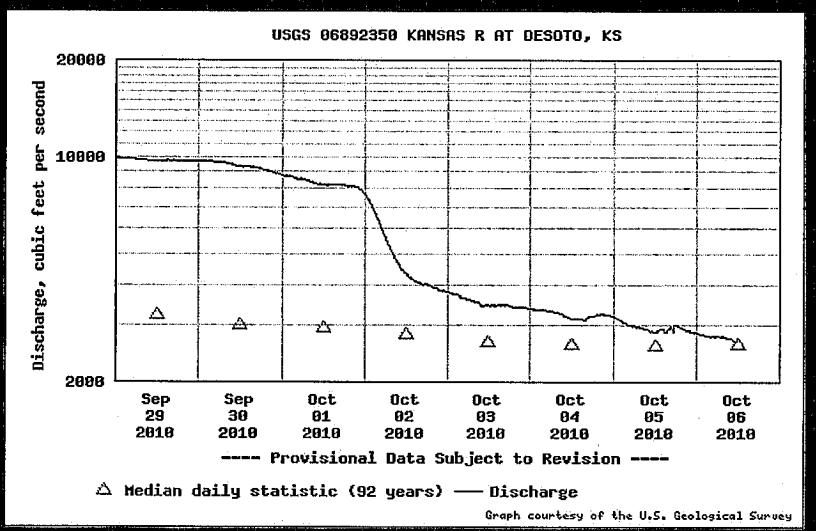
Phase V Expansion

- 40 year Master Plan adopted in 2003
- Designed to meet supply needs of entire service area development
- First stage (phase V) just completed at a cost of $175 M:
  - Horizontal collector well on Missouri River
  - Wolcott Water Treatment Facility
  - 17 miles of 60 inch treated water transmission main

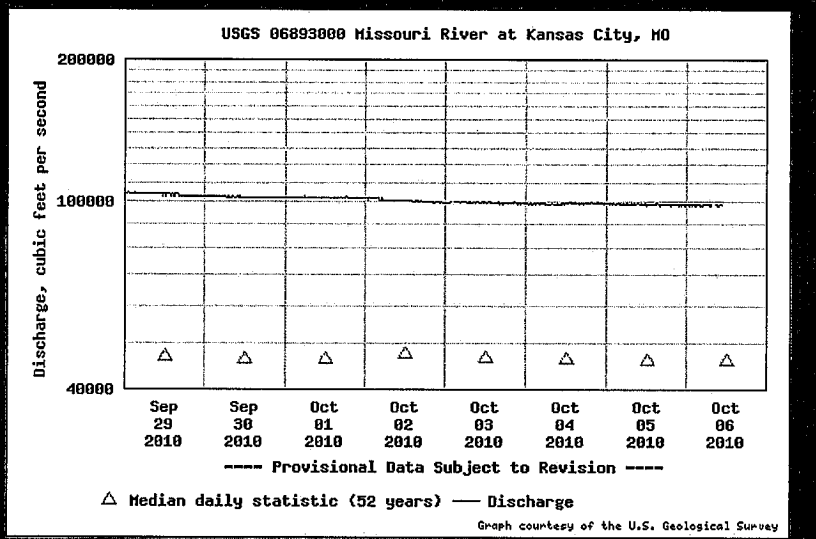
Why the Missouri River?

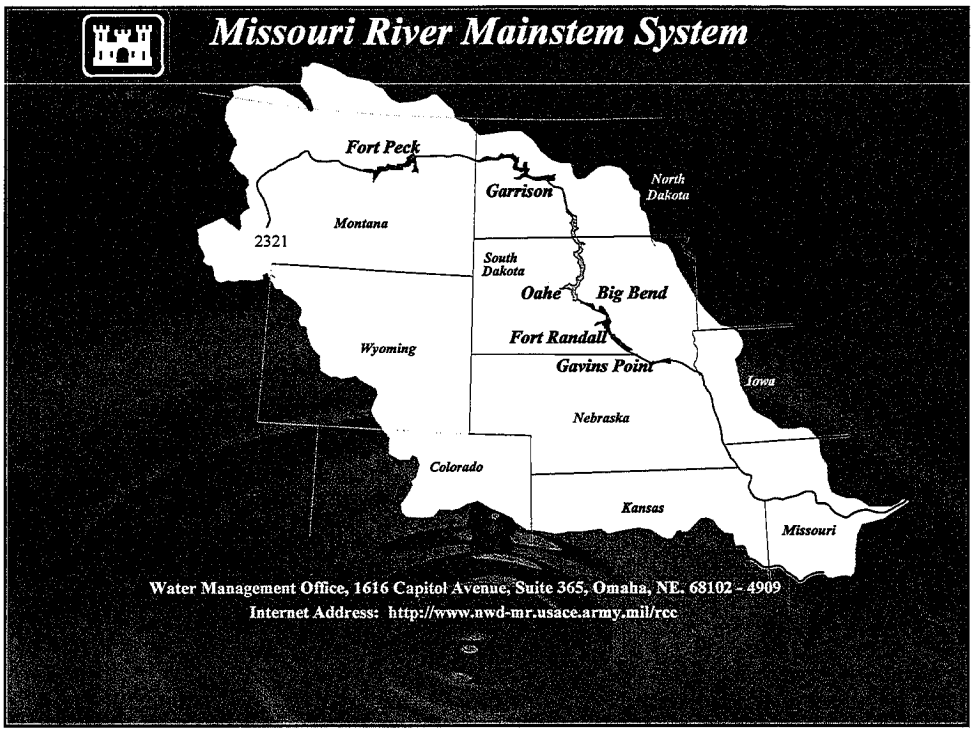
- Less vulnerable to drought
- Maximized long term availability of supply
- Lowes cost and rate impact
- Minimize operations costs

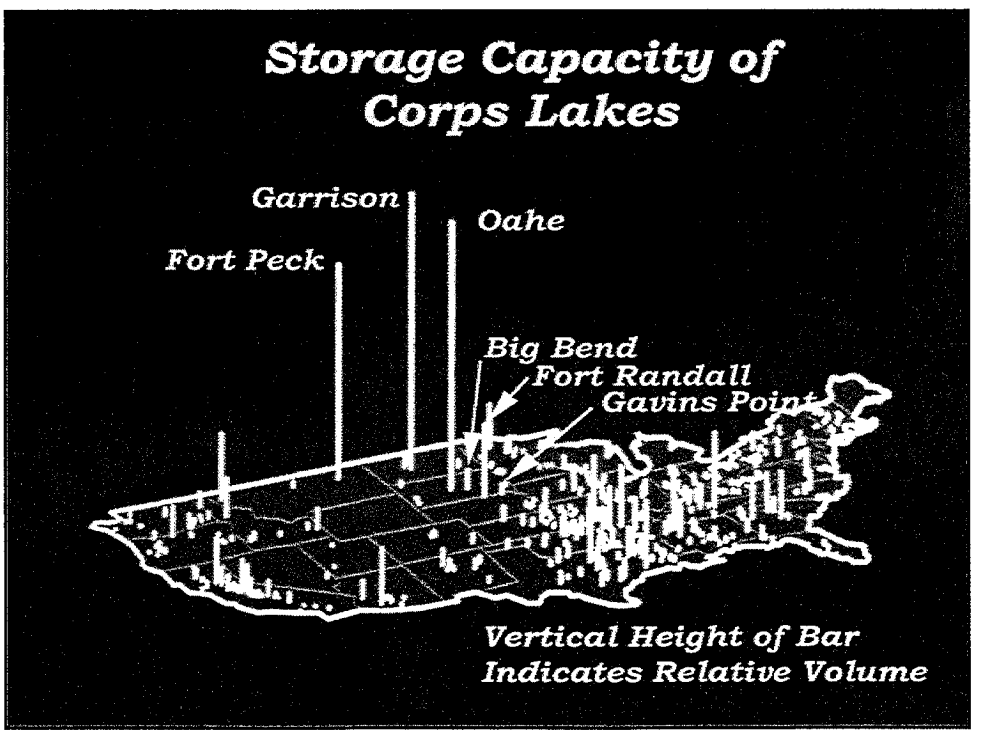
The average flow of the Kansas River is 2600 Cubic Feet per Second (CFS)

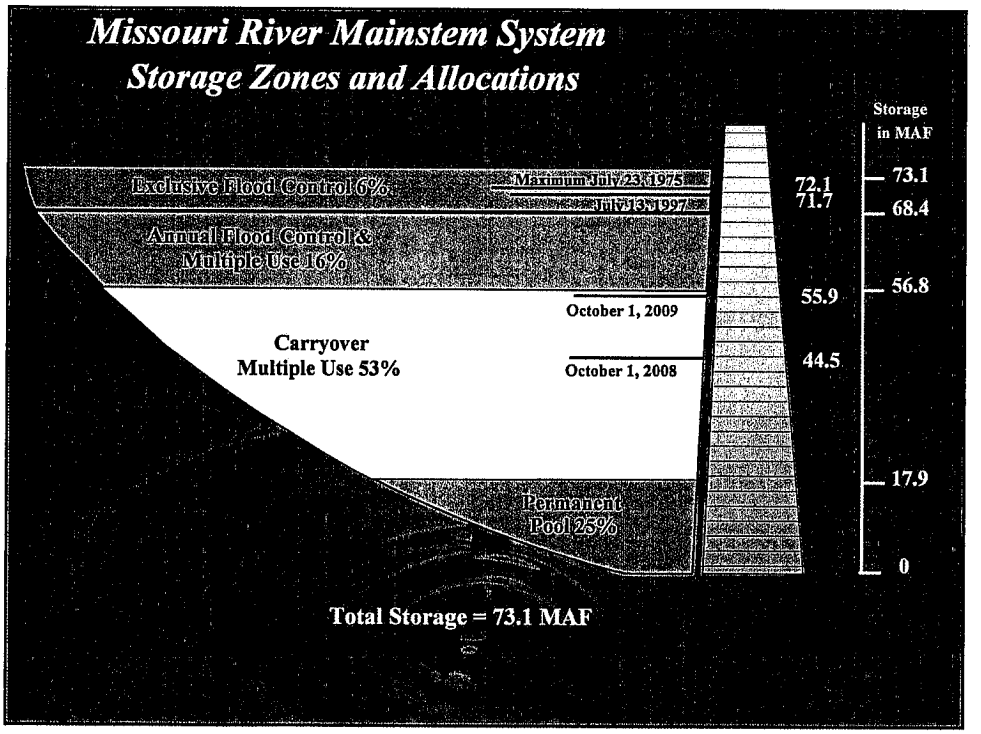


The average flow of the Missouri River is 46,000 CFS



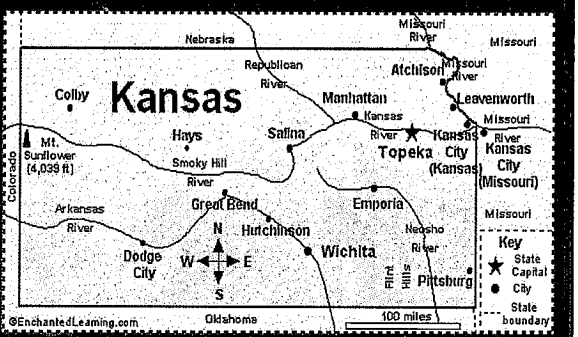

Missouri River Mainstem System
Fort Peck
Garrison
North Dakota
Montana
2321
South Dakota
Oahe
Big Bend
Fort Randall
Wyoming
Gavins Point
Iowa
Nebraska
Colorado
Kansas
Missouri
Water Management Office, 1616 Capitol Avenue, Suite 365, Omaha, NE. 68102 - 4909
Internet Address: http://www.nwd-mr.usace.army.mil/rcc


Storage Capacity of Corps Lakes
Garrison
Oahe
Fort Peck
Big Bend
Fort Randall
Gavins Point
Vertical Height of Bar
Indicates Relative Volume



Why is the Missouri River important to Kansas?

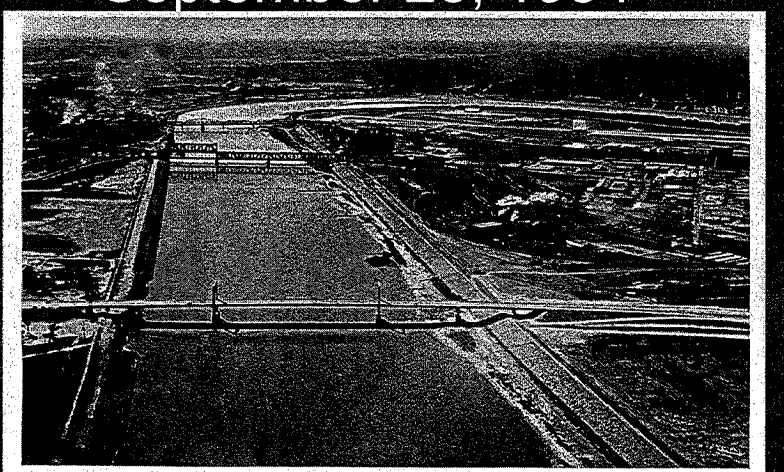
- Approximately 25% of the State's population relies upon the Missouri River for its water supply.



There are problems with the Missouri River

- Due to river bed degradation, WaterOne has spent $2.35 M to install low river pumping facility
- The facility costs an estimated additional 20K/yr in energy costs and 750K/yr in treatment expenses
- Missouri River degradation contributes to head cut on Kansas River
- Bed degradation adversely affects bridges, pipelines, levees and power plants

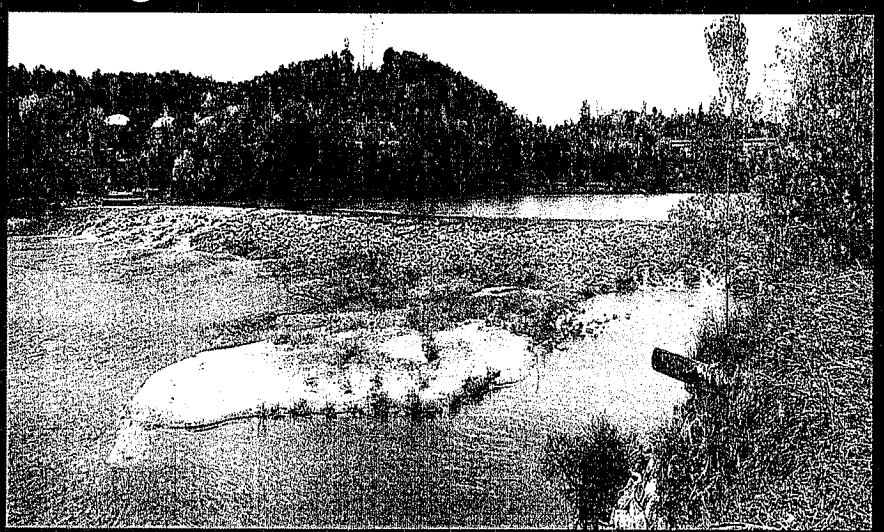
View of the Missouri September 23, 1954



MISSOURI RIVER IMPROVEMENT
KANSAS CITY DISTRICT CHANNEL STABILIZATION AND NAVIGATION PROJECT KANSAS CITY, MISSOURI
AERIAL VIEW WEST (UPSTREAM) FROM APPROXIMATE RIVER MILE 370, SHOWING PORTION OF RIVER FROM KANSAS CITY REACH TO KANSAS RIVER BEND. LEVEE AND BANK PROTECTION ALONG LEFT BANK IN NORTH KANSAS CITY UNIT, LEVEE AND BANK PROTECTION ON RIGHT BANK IN EAST BOTTOMS UNIT. BRIDGES FROM BOTTOM UP ARE: NEW PASEO BRIDGE; (A.S.B.) HIGHWAY & RAILWAY BRIDGE AND K.B. & S. R.R. (HANNIBAL) RAILWAY AND HIGHWAY BRIDGE. CONFLUENCE OF KANSAS AND MISSOURI RIVERS IN CENTER BACKGROUND.
23 SEPTEMBER 1954 NEG. NO. 61775

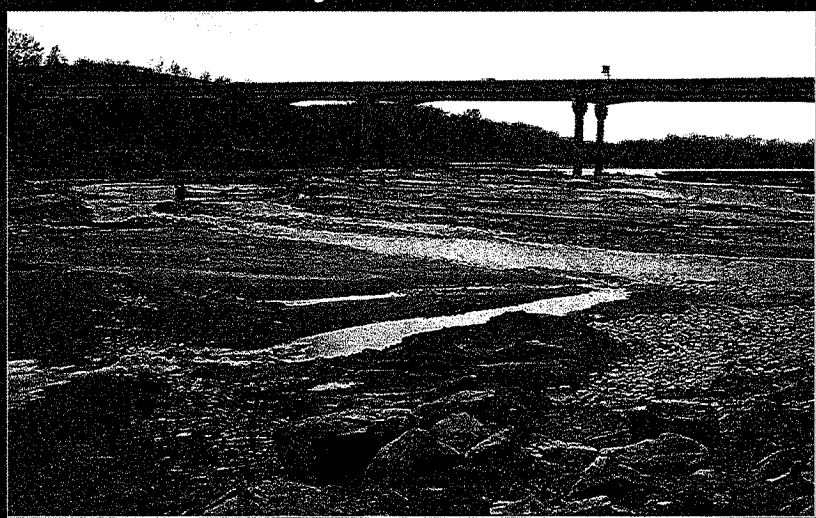
Current view

Kansas River Weir: Original construction in 1970's



2004 Breach

Condition of upstream Kansas River 3 days after the breach

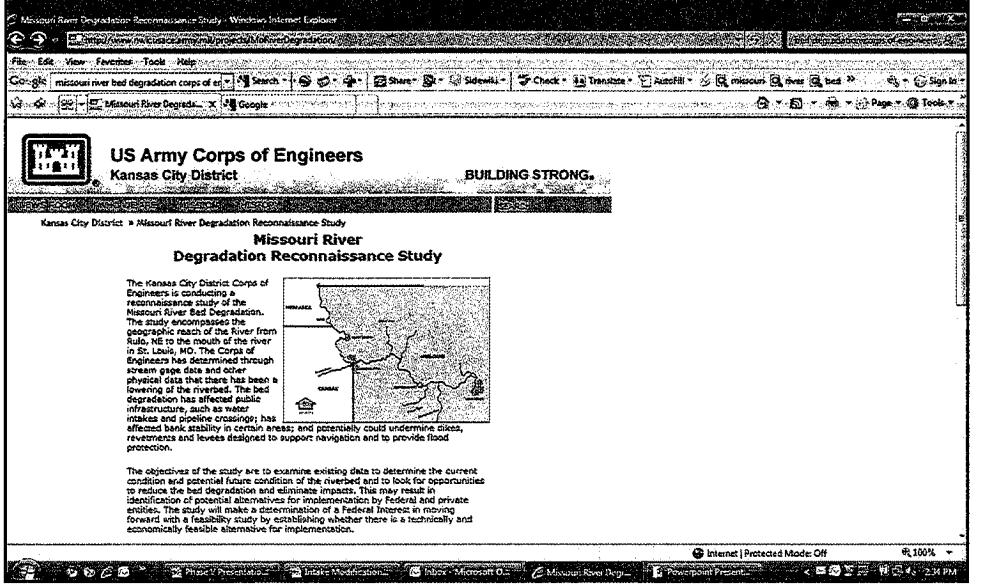


2009 completed construction of new Kansas River Weir

Degradation Feasibility Study

- WaterOne is working with the Mid-America Regional Council and the U.S. Corps of Engineers to coordinate a group of stakeholders.
- The goal is to conduct a cost share study with the federal government to determine cause of degradation and potential solutions.

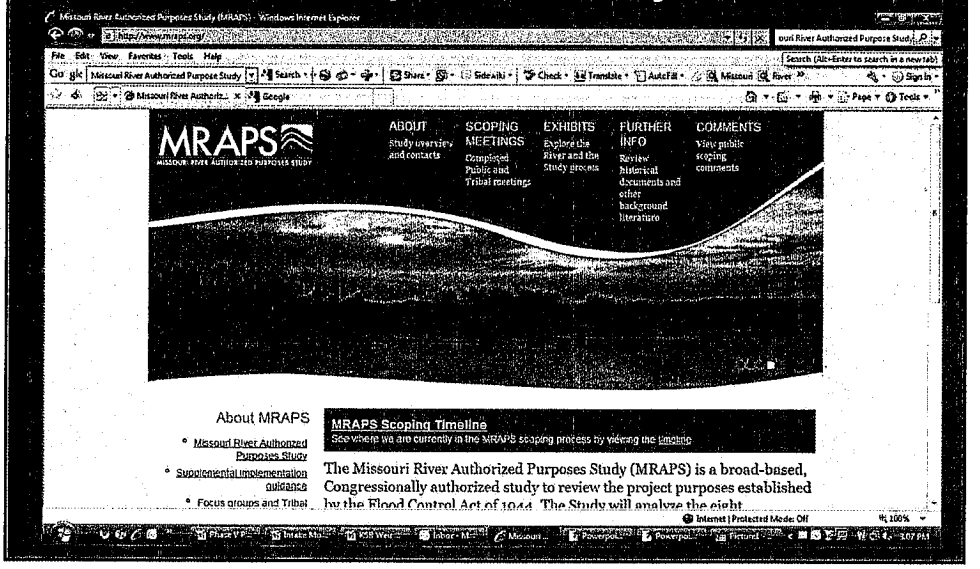
Finding a Solution



Degradation Feasibility Study

- Phase 1 of the Study is estimated to cost $3.6 Million.
- Degradation has impact on both sides of the State line.
- Stakeholders on the Kansas side include the Kansas Department of Transportation; BNSF Railway; Leavenworth; BPU; and the Kansas Water Office.
- Legislature should include funding in the budget.

Missouri River Authorized Purpose Study



MRAPS

- The study is in its early stages.
- There must be broad based stakeholder involvement.
- Relationships exist that are not apparent in the uses of the river:
  - For instance, navigation flows and bank stabilization efforts are important to the viability of public water supply facilities.

What Eastern Kansas Water users need from the Legislature

- Missouri River Bed Degradation—allocate funding to the Feasibility Study.
- MRAPS—consider the study in light of all stakeholder interests on the River. Be aware of the relationships that exist between river uses.
- Kansas Water Authority—expand membership to include a water assurance district representative and a Missouri River representative.

QUESTIONS?

CITY OF HAYS

Water Conservation in Hays, Kansas: History and Possible Implications

Presented to:

Joint Committee on Energy and Environmental Policy

Presented by:

Henry Schwaller,
Commissioner, City of Hays

Room 152S - Statehouse

October 8, 2010

JOINT COMMITTEE ON ENERGY AND ENVIRONMENTAL POLICY

DATE: 10/8/10

ATTACHMENT 18

Introduction

In 1991, Hays experienced a water shortage in one of its primary water sources, a crisis that caught city officials and residents by surprise. As a result, local elected officials and residents worked together to create a series of short term and long term water conservation initiatives. The city's residents now consume less water per capita and have adopted a culture of sustainability. The purpose of this presentation is to provide an overview of the history of the 1991 crisis, the community's response to the crisis, and the future of water conservation in Hays and other Kansas communities.

History

Hays' water use has changed dramatically over the past 17 years:

1. In 1983 Hays used a total of 3,600 acre feet (AF) of water (1af = 325k gal)
2. In 2009 Hays used 2,000 AF of water
3. This reduction coincided with a 25 per cent increase in population and a 35 per cent increase in businesses and households.

This dramatic decline in consumption resulted from a crisis in 1991 when Hays "ran out of water" in one of its water sources, a well field located south of Hays on the Smoky Hill River. Two events contributed to the crisis: 1) the city's well field along the Smoky Hill River could not meet municipal demand; and 2) the area's annual rainfall did not keep pace with residents' demand (average rainfall in Hays is 22 inches per year, compared to 45 inches in Eastern Kansas). Elected officials and city staff worked with local residents to resolve the problem through a series of short and long-term initiatives:

Short Term Initiatives:

1. Water restrictions
2. Higher rates
3. Desperate search for additional water source

Long Term Initiatives:

1. The city continued search for long term source (e.g., "home run" approach) – but quickly discovered that no easy solutions exist. So city officials began to rethink their approach:

a. What can our current sources sustain?
b. What happens if we continue at current pace?

2. Coupled with this self-reflection were a number of regulatory/policy changes designed to extend the use of existing sources through:
   a. Establishment of a conservation rate
   b. Incentives and regulatory changes, such as
      1) City gave away over 7,000 low flow shower heads and provided $100,000 for low flow toilets
      2) Low flow toilets and shower heads required for all hotels and incorporated into building code
      3) $50,000 in rebates for purchase of high-efficiency washing machines
      4) Incentives for xerascaping and replacing cool season grasses with warm season grasses
      5) Outdoor watering restrictions
   c. Internal changes
      1) Parks, ball fields, golf course and sports complex irrigated with effluent
      2) Aggressively replaced all water meters and older distribution lines. Unaccounted water in the 4% to 7% range. Industry average of 12-15%.
   d. Economic development strategy developed a long-term orientation
      1) In 1992, voters approved a ½ cent sales tax dedicated to water and search for long term solutions
      2) Large industrial water users were not sought out and sometimes turned down or directed elsewhere
      3) Purchased 6,400 acre R9 Ranch in Edwards County with 7,700 AF of water rights

Current and Future Water Use

As a result of these initiatives, Hays' water usage is down 45% from peak demand - the same consumption level as in 1972. Forecasts show that with current water sources and

continued conservation, the city will meet demand until mid 2030s. More importantly, the community's attitude about water usage has changed: conservation is part of the culture. This is due to three critical factors:

1. City staff and elected officials did wonderful job in getting buy-in to the solution
2. Residents were educated along the way
3. Rates lowered with no corresponding increase

Water conservation will continue into the foreseeable future because residents understand the need for continued conservation and understand that change is permanent - not a "phase" of "period" - and a way of life. Also, the city sales tax allows city officials to be diligent in search for long term source. It will be difficult to find a "home run" that solves all of Hays' water concerns, so the most likely solution is continued improvement of existing resources or new approach through:

1. Artificial aquifer recharge
2. ASR
3. Managed wetlands

Furthermore, city residents took the initiative to extend the concept of water conservation to other community functions, creating an overall culture that embraces conservation and sustainability. As a result, Hays:

1. Operates of the most comprehensive curbside recycling programs in state
2. Manages a yard waste disposal site and provides free mulch and compost
3. Provides, in conjunction with Ellis County, a tree branch disposal site
4. Grinds reclaimed concrete and brick for use in alleys
5. Re-uses asphalt millings on many less-traveled streets and parking lots
6. Recycles street sweepings as base for concrete

SUMMARY

Hays' experience demonstrates that a community can create a shared culture of water conservation and sustainability through a strategy focused on: 1) community education; 2) proactive systems of incentives and regulations; and 3) a shared attitude of making existing resources last as long as possible. Other Kansas communities may face similar challenges in the future and it is important that the State of Kansas takes an active role in embracing initiatives that reward sustainability.

Irrigation Systems and Water in Kansas Agriculture

Danny H. Rogers, PE, PhD

Professor and Extension Agricultural Engineer, Irrigation
Kansas State University Research and Extension
Department of Biological and Agricultural Engineering
Manhattan, KS

Prepared for the
Joint Committee on Energy and Environmental Policy
October 8, 2010

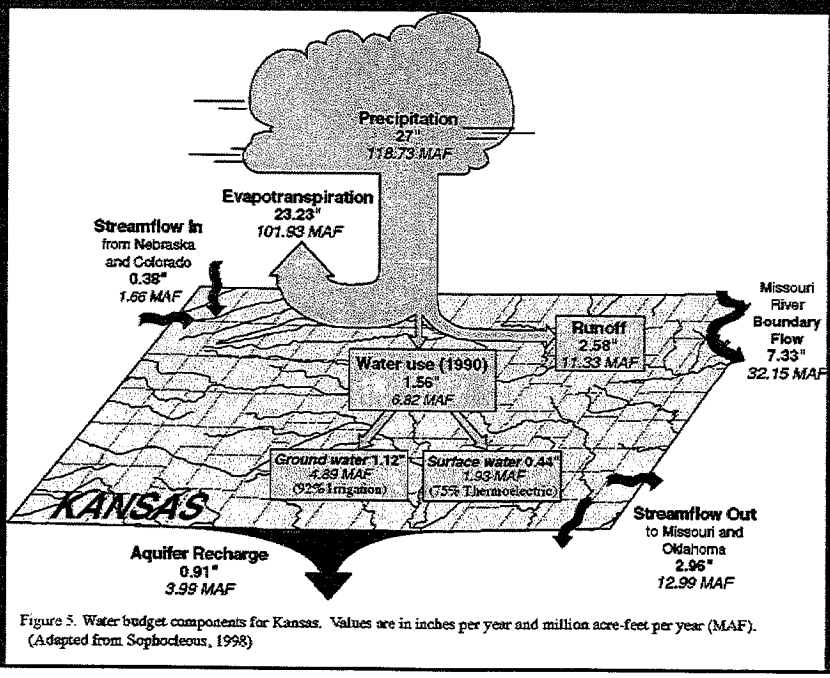
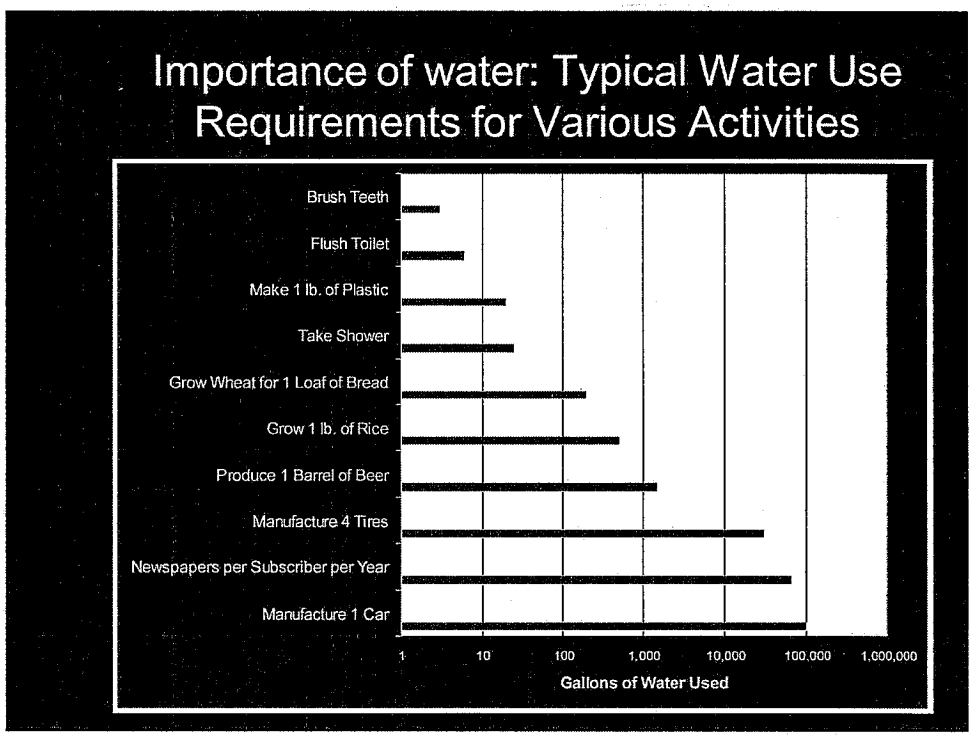


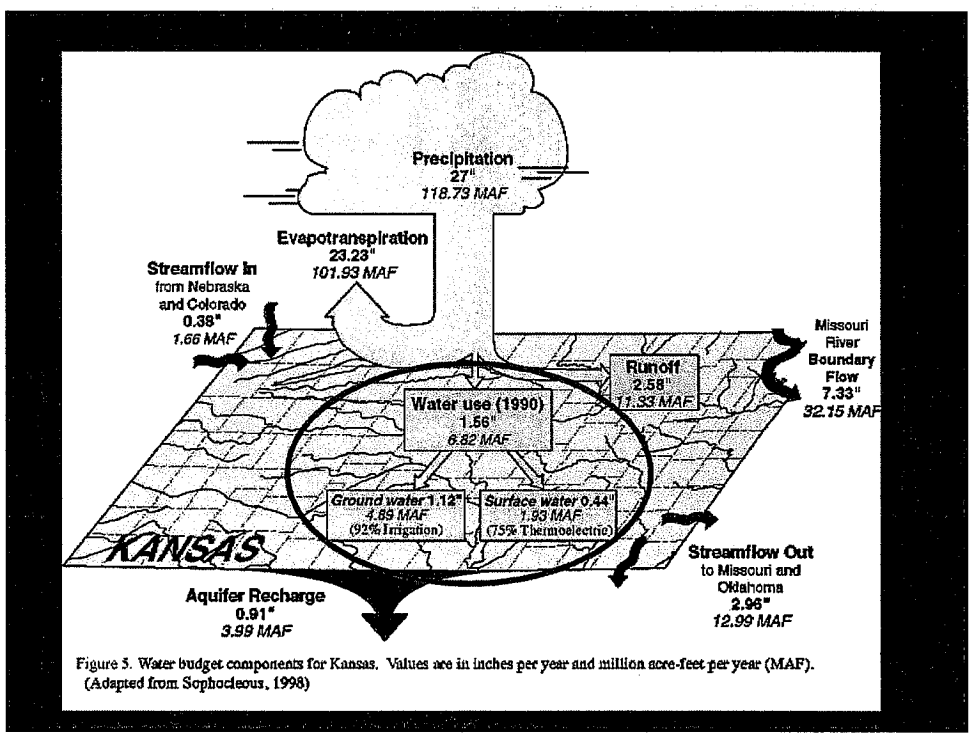
Figure 5. Water budget components for Kansas. Values are in inches per year and million acre-feet per year (MAF). (Adapted from Sophocleous, 1998)

JOINT COMMITTEE ON ENERGY AND ENVIRONMENTAL POLICY

DATE: 10/8/10

ATTACHMENT 19





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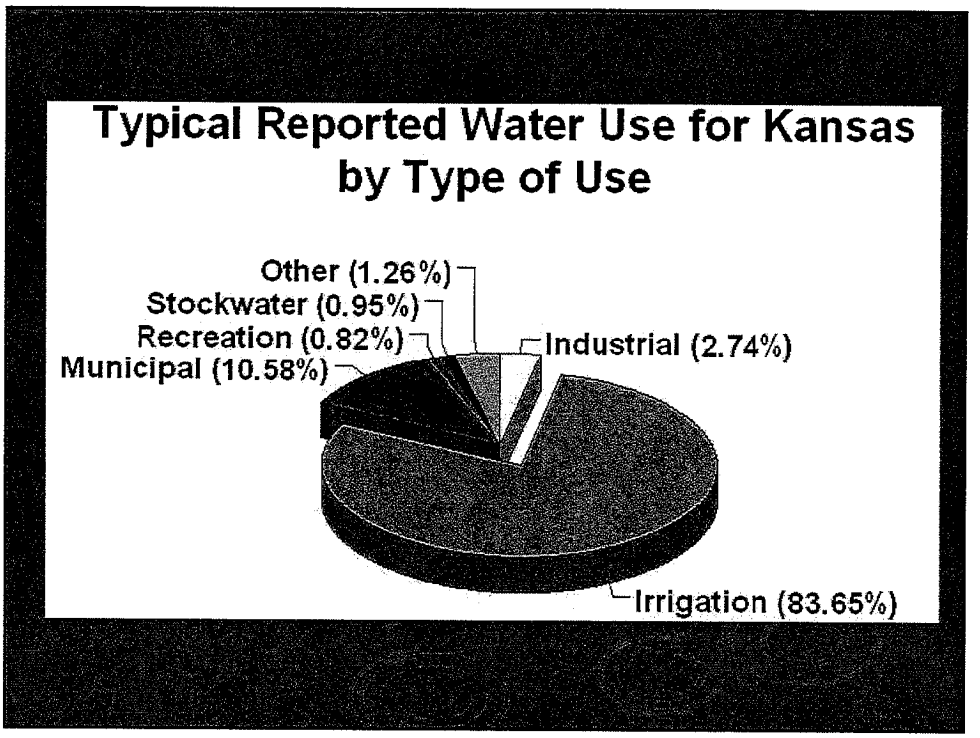


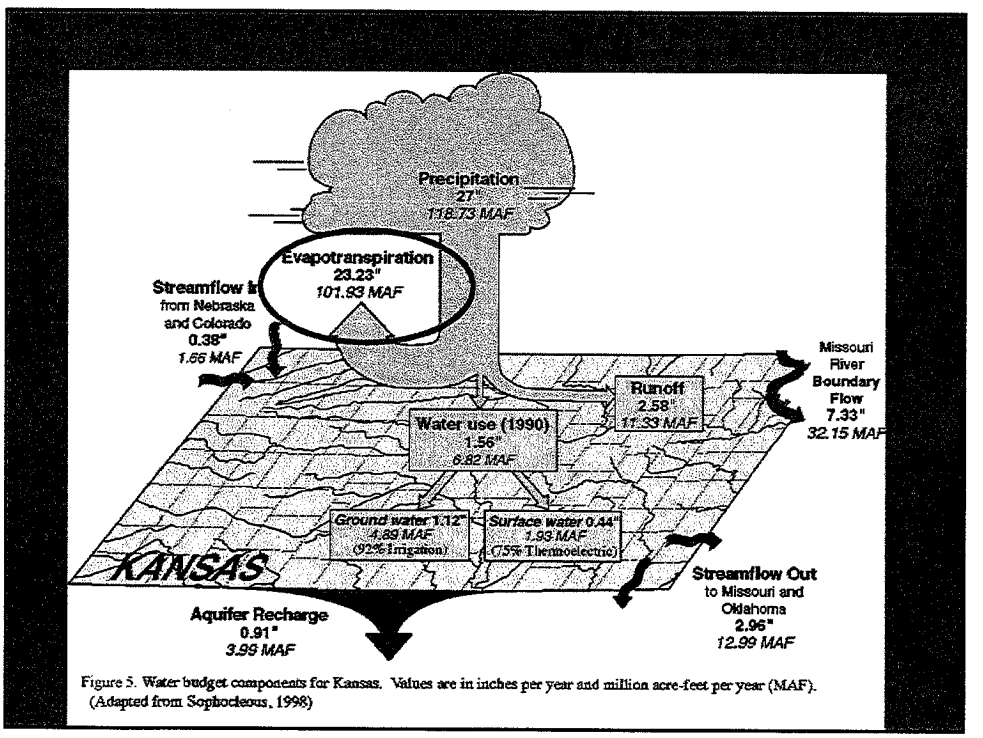


Figure 5. Water budget components for Kansas. Values are in inches per year and million acre-feet per year (MAF). (Adapted from Sophocleous, 1998)

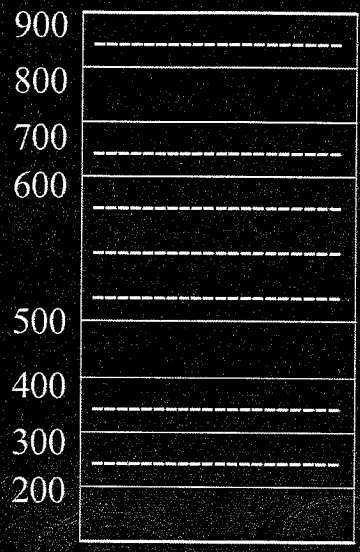
Plant growth, and therefore food production, is water intensive

- An acre-inch of water is 27,154 gallons
- Therefore, on a hot, sunny day, a quarter acre lawn could transpire about 3500 gallons of water.

Seasonal Crop Water Use (ET), Daily Peak Water Use, Weekly Peak Total Water Use

Crop	Crop Water Use (ET) (inches)	Peak Usage	
		Weekly	Daily
Alfalfa	32-48	2.8	.55
Corn	24-30	2.5	.50
Dry Beans	16-24	2.1	.40
Wheat	16-22	2.0	.40
Sorghum	16-22	2.2	.40
Sunflowers	16-20	1.8	.28
Soybeans	18-24	2.2	.32

Water Transpired by Plants for Each Pound of Above-Ground Dry Matter Produced

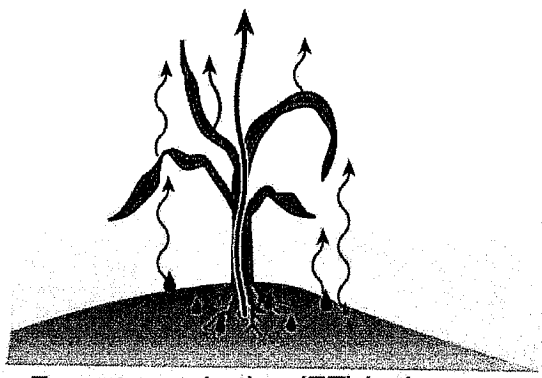


Water Requirements for a Holiday Dinner (4 Adults and 4 Children)

Item	Gallons of Water Needed
20 lb. Turkey	16,300
Stuffing	6,004
Potatoes	72
Scalloped Corn	1,824
Green Beans	1,000
Carrots	1,000
Waldorf Salad	580
Fresh Fruit Salad	2,000
Bread	300
Margarine (incl. cooking)	2,212
Pumpkin Pie	1,240
Ice Cream	1,142
Milk for Four	1,000
Wine for Four	8,000
	42,674 Gallons of Water

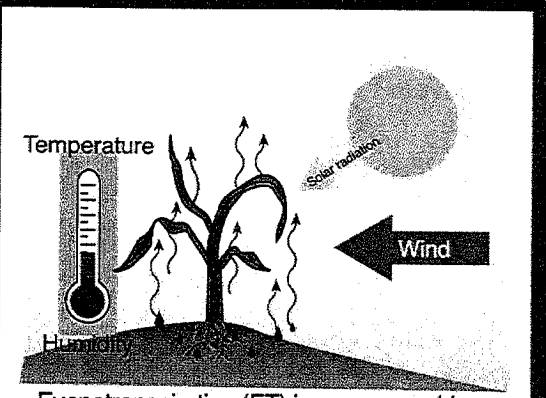
Food Production Water Use

- *It takes **1,400** gallons of water to make a* **hamburger, french fries and a soft drink**



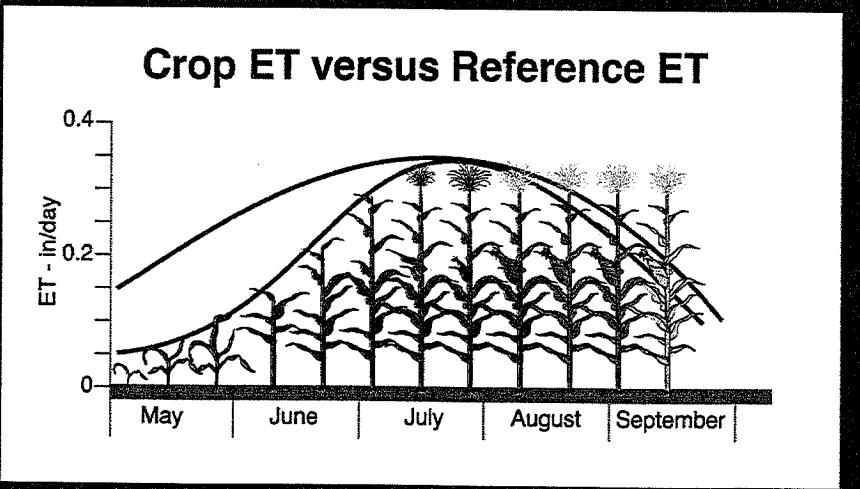
- Evapotranspiration (ET) is the combination of evaporation and transpiration.
- Evaporation is water movement from wet soil and leaf surfaces.
- Transpiration is water movement through the plant.

ET is the combination of evaporation and transpiration. It is an energy driven process.

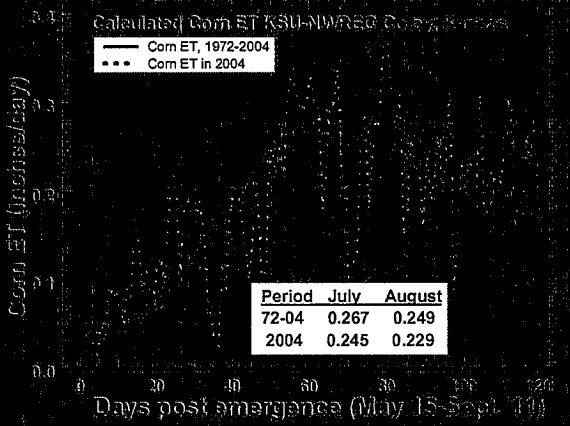


- Evapotranspiration (ET) is an energy driven process.
- ET increases with temperature, solar radiation and wind.
- ET decreases with increasing humidity.

Reference ET is modified to Crop ET by the use of Crop Coefficients

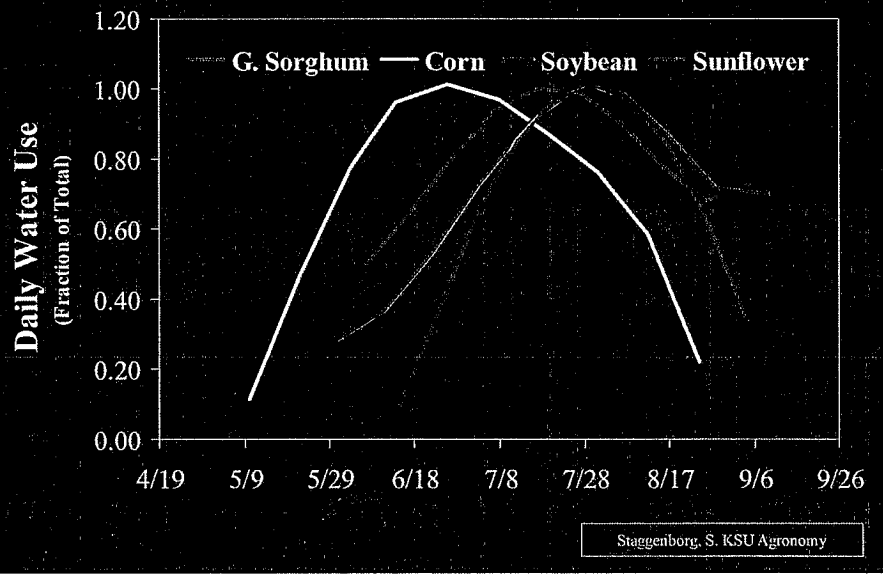


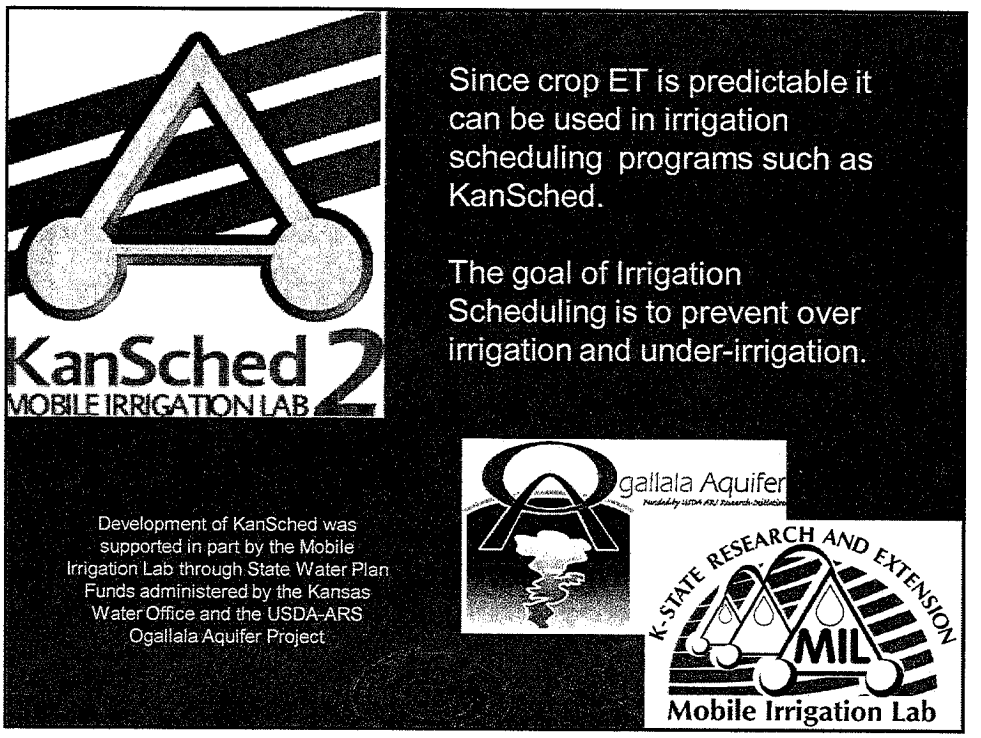
Example of daily fluctuation of ETr



Period	July	August
72-04	0.267	0.249
2004	0.245	0.229

Peak Water Use Timing

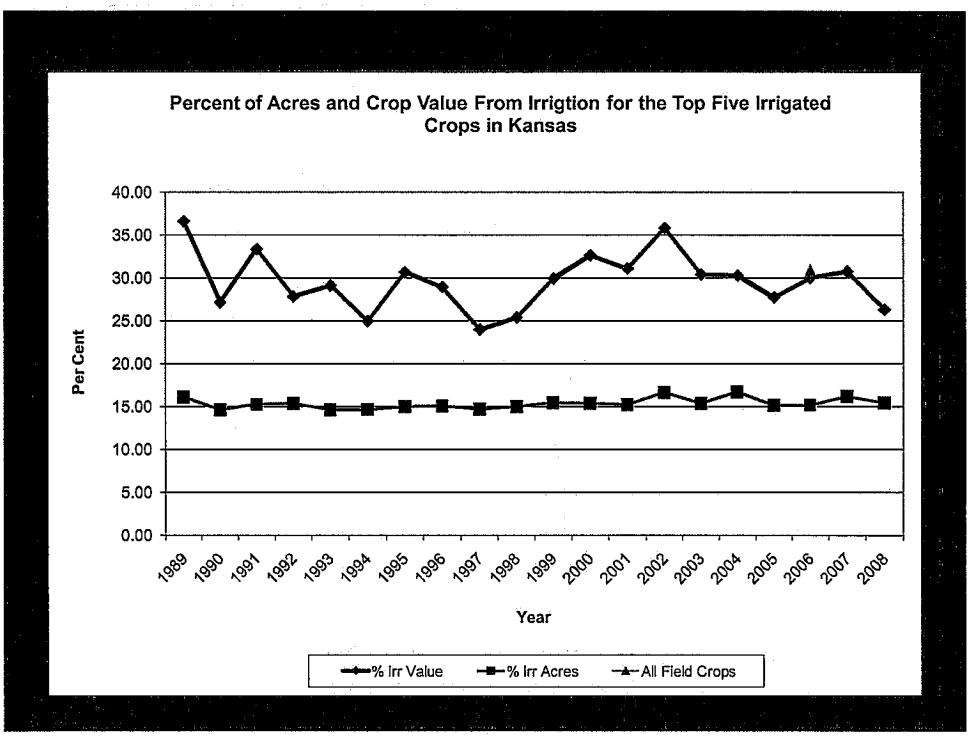




Why Irrigate?

Improve yield, stabilize yield, improve quality, improve economy, etc

Time of Irrigation Study at Scandia Exp. Farm	1991 Yield Bu/Ac	1980-1991 Bu/Ac	1991 Irrigation Date
No Irrigation	3	56	None
Tassel	124	141	7/8
Tassel + 1 week	148	159	7/8, 7/15
Tassel + 1 + 2 week	155	164	7/8. 7/15, 7/25
65% depletion	159	172	7/1, 7/23



2002 Western Kansas Crop Production Statistics for Wheat, Grain Sorghum, Corn, Soybeans, and Alfalfa*

Total of Irrigated and Dryland	1000's of Acres	Total Value 1000's of $
	5,372	905,163
Irrigation Percentage	36.7%	70.2%

* Other crops not included are silage, sunflower, cotton, and dry beans

2002 Southwest Kansas Crop Production Statistics for Wheat, Grain Sorghum, Corn, Soybeans and Alfalfa*

Total of Irrigated and Dryland	1000's Acres	Total Value 1000's of $
	2,532	565,555
Irrigation Percentage	53.5%	85.8%

*Other crops not included are silage, cotton, sunflower, and dry beans.

2000 Haskell County Crop Production Statistics for Wheat, Grain Sorghum, Corn, and Alfalfa*

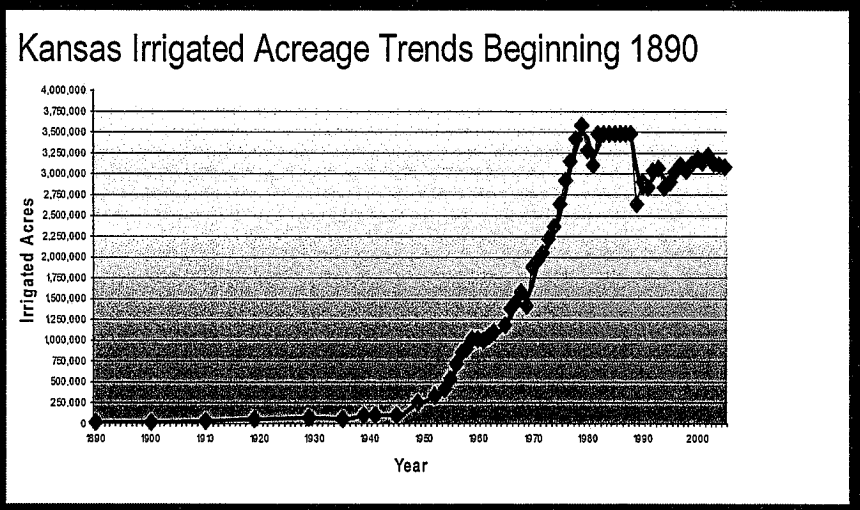
Total of Irrigated and Dryland	1000's of Acres	Total Value 1000's of $
	224.2	63,782.8
Irrigation Percentage	74.9%	94.3%

* Other crops not included are silage, cotton, sunflowers, soybeans, and dry beans

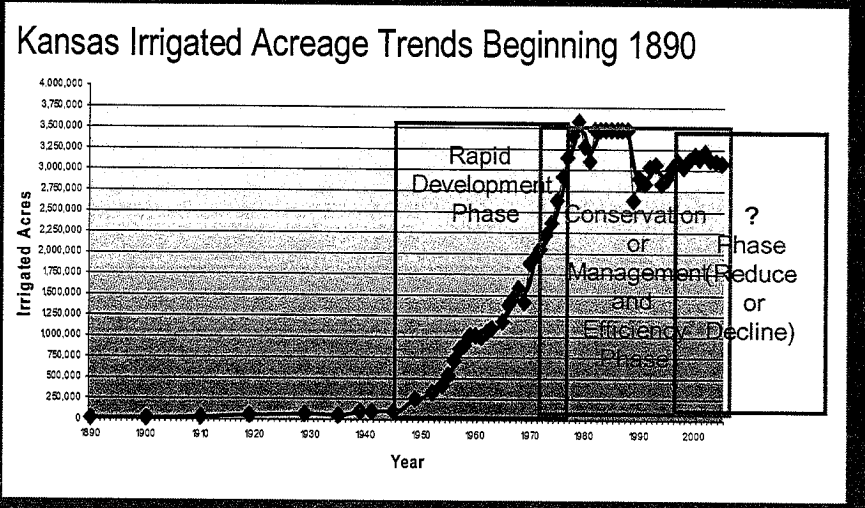
Kansas Irrigation Development

- Kansas irrigation development increased rapidly following WWII due to a combination of factors including:
  - *Technology – pumps and engines
  - *Energy supply (Natural Gas)
  - *Personal and Political Will - 1945 Water Appropriation Act

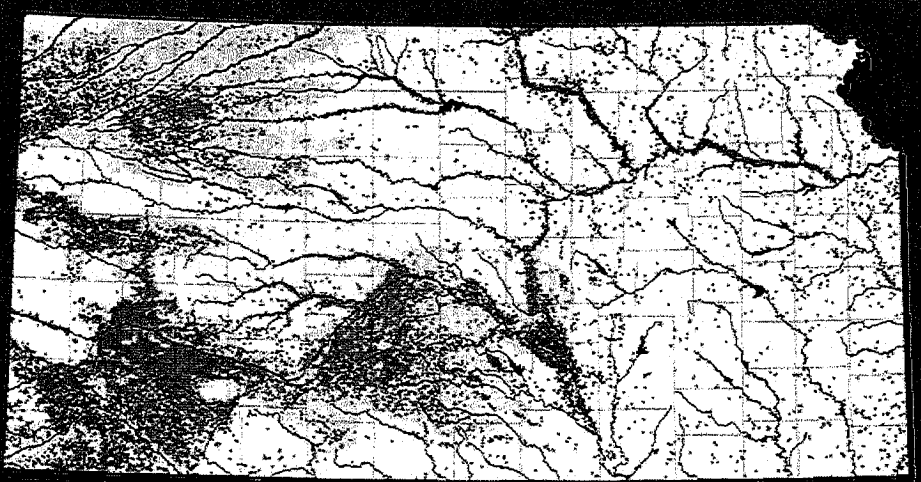
Kansas Irrigation Development

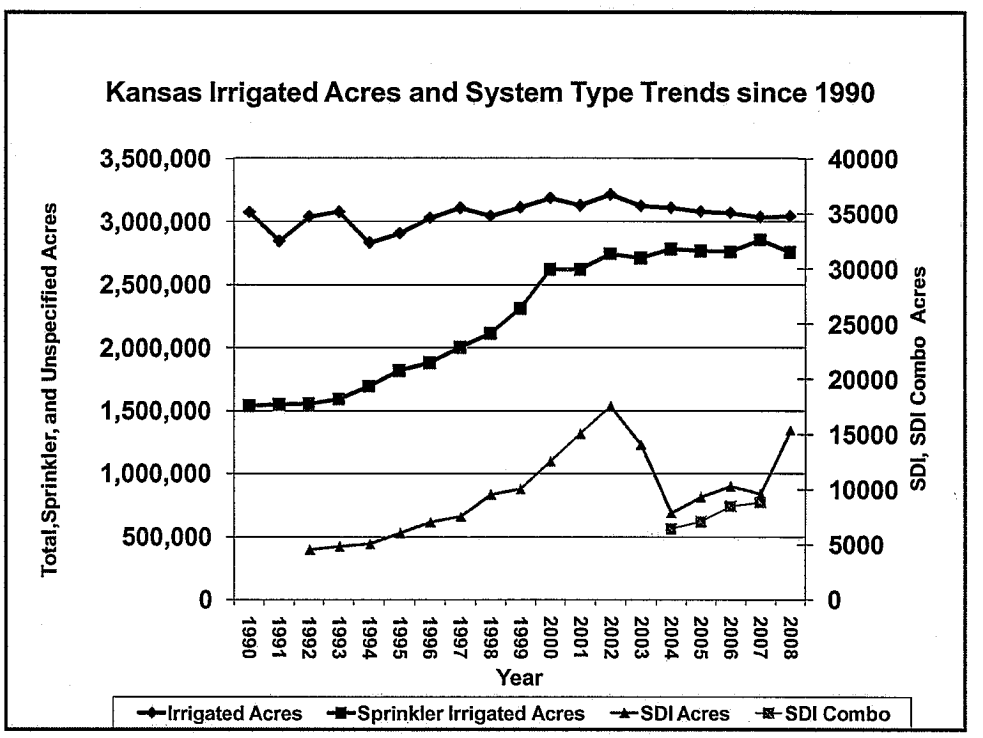


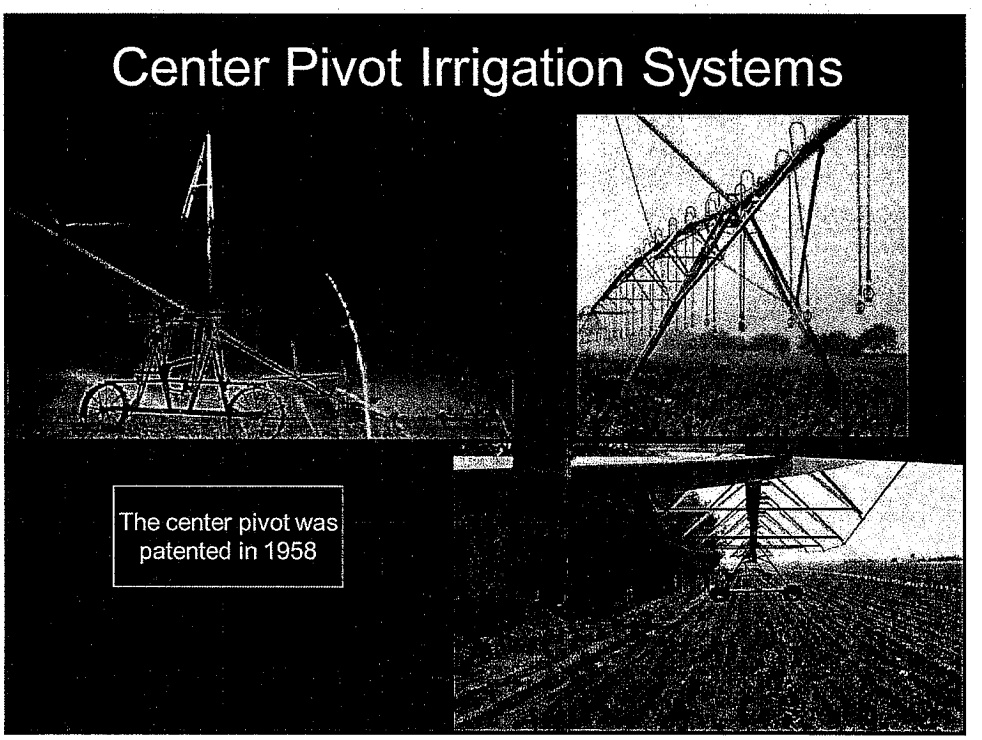
Kansas Irrigation Development



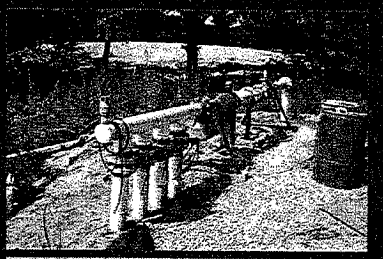
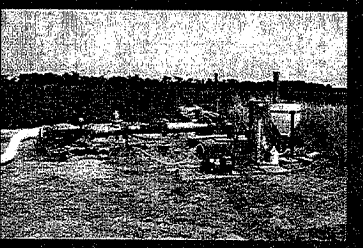
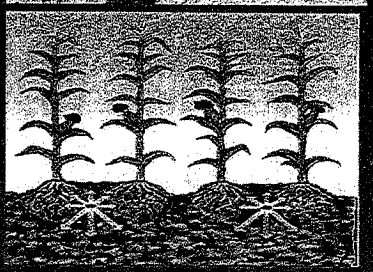
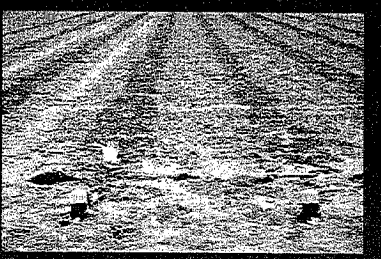
Kansas Irrigation: Points of Diversions

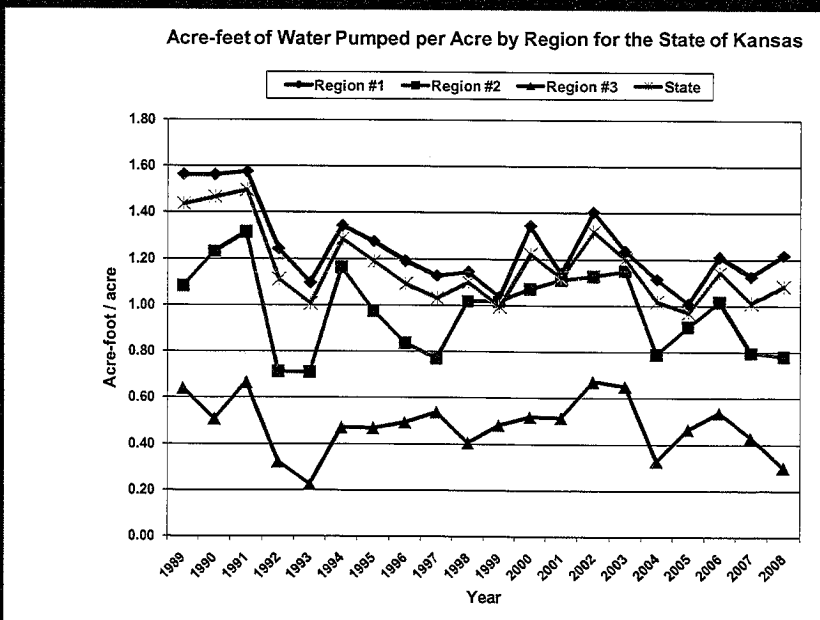


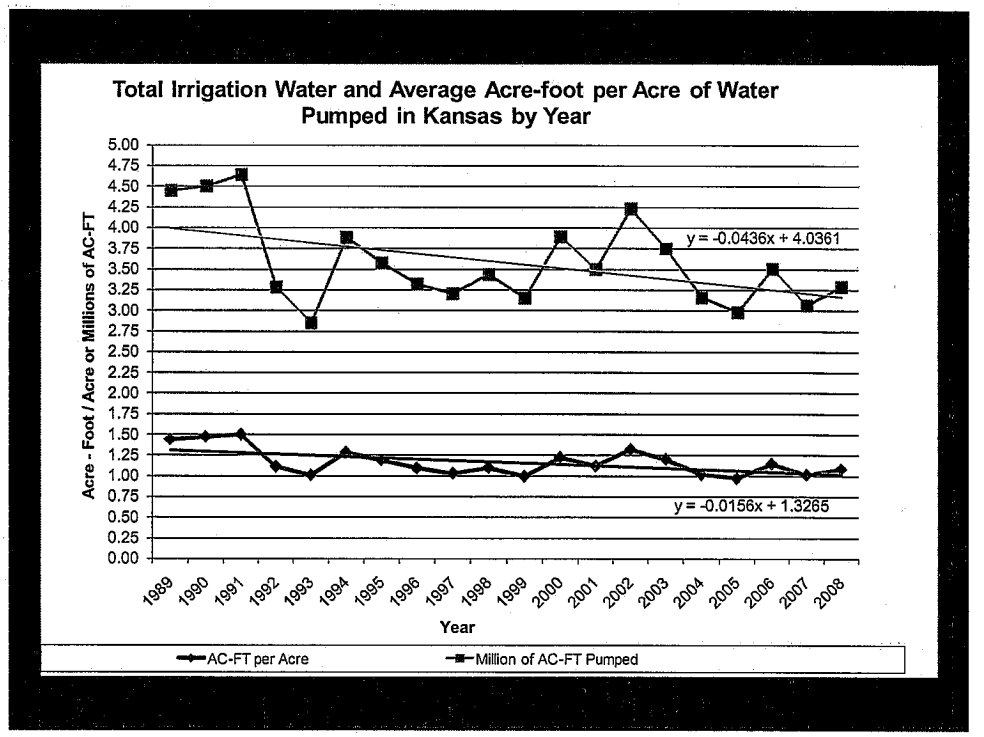

Kansas Irrigated Acres and System Type Trends since 1990
Total,Sprinkler, and Unspecified Acres
SDI, SDI Combo Acres
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
40000
35000
30000
25000
20000
15000
10000
5000
0
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
Year
Irrigated Acres
Sprinkler Irrigated Acres
SDI Acres
SDI Combo


Center Pivot Irrigation Systems
The center pivot was patented in 1958

Subsurface Drip Irrigation - SDI

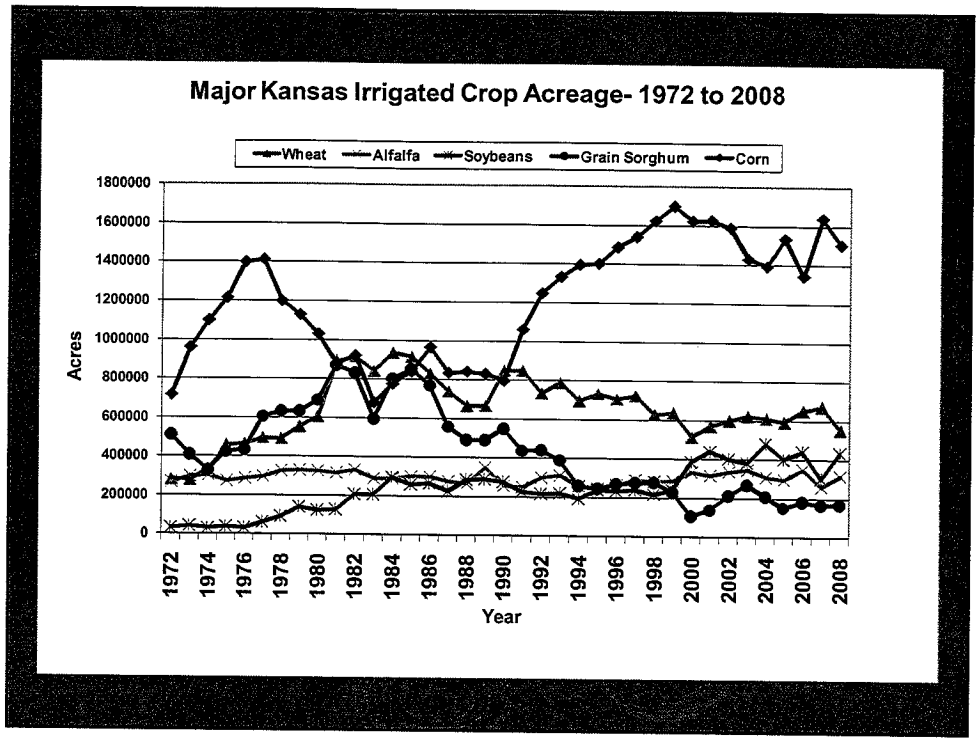


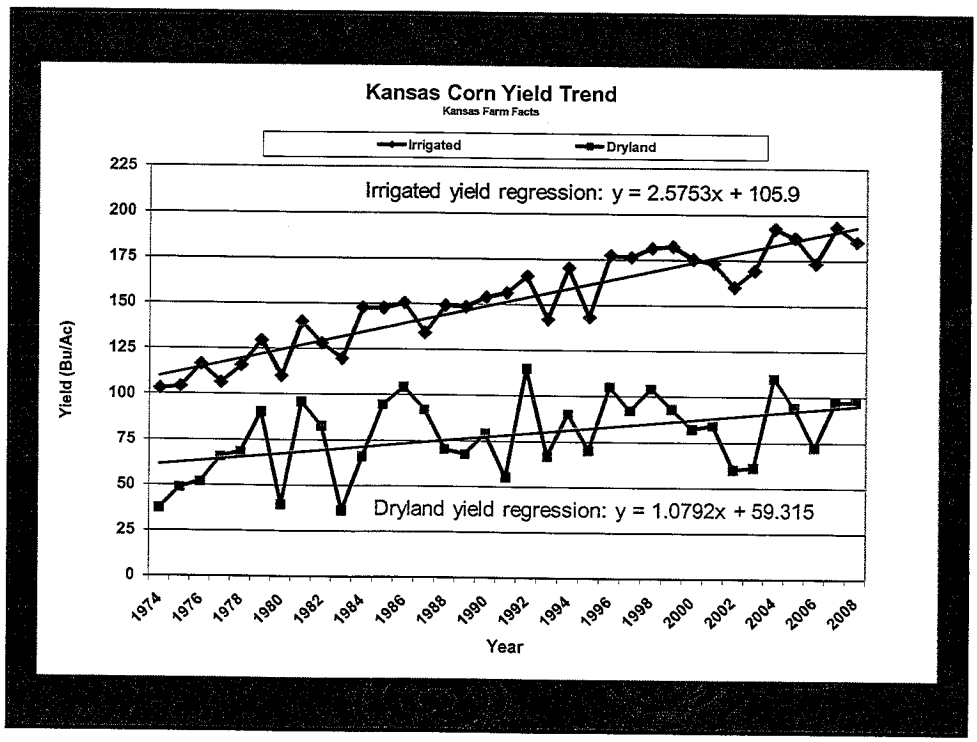


Kansas Cropland, Irrigated Acreage, and Irrigation Water Use

Year	Total Cropland (Harvested) Acres*	Total Irrigated Acres+	Irrigation Water Use (AF)
1993	20,454,400	2,841,000	2,828,973
	Irrigation Percentage of Total Cropland	13.9%	
2000	21,656,900	3,183,983	3,885,805
	Irrigation Percentage of Total Cropland	14.7%	
2002	20,230,400	3,211,859	4,228,410
	Irrigation Percentage of Total Cropland	15.9%	

* Kansas Farm Facts
\+ Kansas Irrigation Water Use Report


Major Kansas Irrigated Crop Acreage- 1972 to 2008
Wheat
Alfalfa
Soybeans
Grain Sorghum
Corn
Acres
1800000
1600000
1400000
1200000
1000000
800000
600000
400000
200000
0
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
Year


Kansas Corn Yield Trend
Kansas Farm Facts
Irrigated
Dryland
Irrigated yield regression: y = 2.5753x + 105.9
Dryland yield regression: y = 1.0792x + 59.315
Yield (Bu/Ac)
225
200
175
150
125
100
75
50
25
0
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
Year

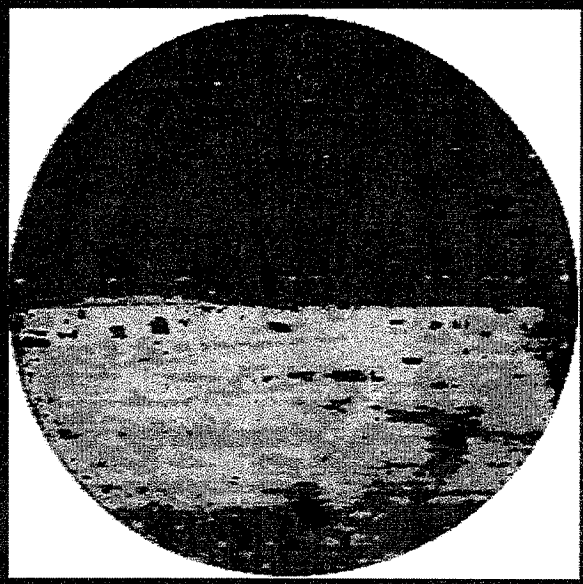
Crop Water Use Efficiency or Crop Water Productivity is the yield produced per volume of water

- Crop yields are increasing
- Irrigation pumping has declined

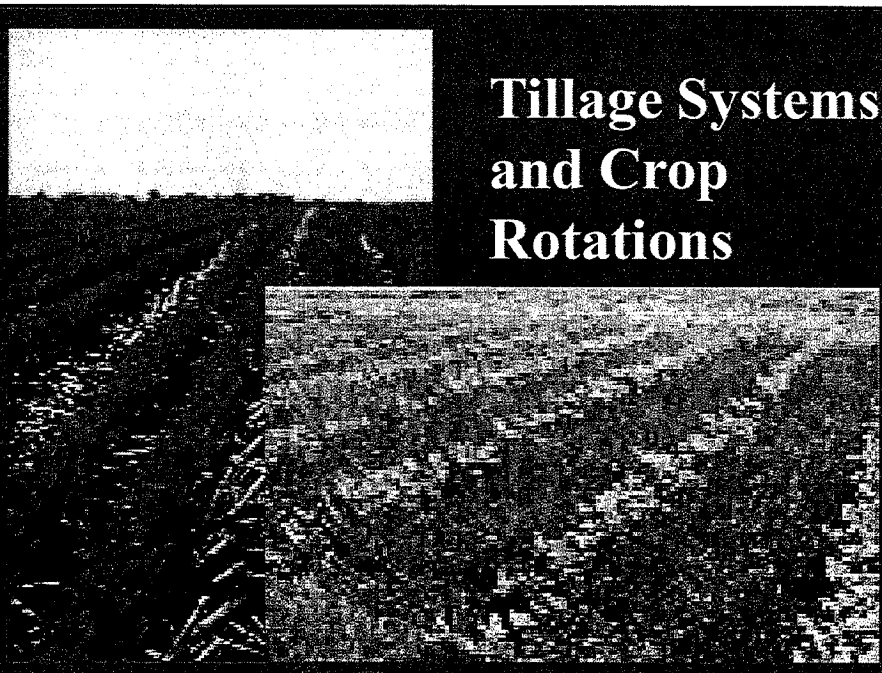
Crop Water Productivity

- Improvements in crops
- Improvements in cultural practices
- Improvements in irrigation systems
- Improvements in irrigation management
- Improvements, in general, have offset loss of irrigation well capacity

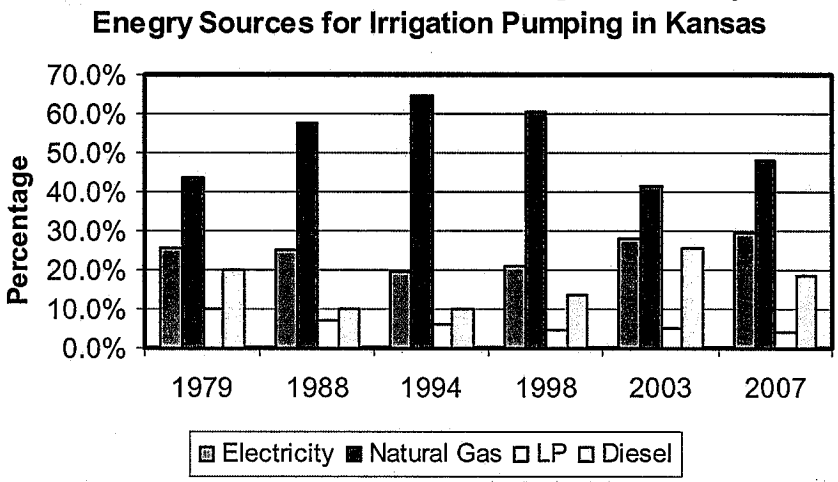
Crop selection, Management and Cultural Practice Effects on Water Productivity

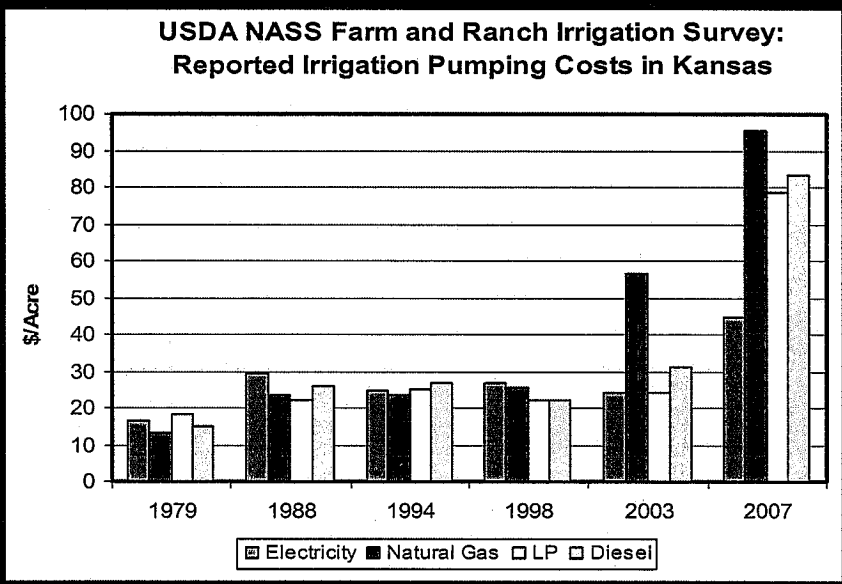


Tillage Systems and Crop Rotations



Kansas Irrigation Energy Trends





Where are we going?

- Physical constraints seem to be the dominate control mechanism for western Kansas. (Economic constraints can be a factor when energy and production costs spiked relative to irrigation crop value.) Western KS physical constraints tend to be gradual and adjustments made individually.
- Institutional constraints (beyond the general appropriation policy) have been implemented, such as IGUCA's, in association with targeted and specific goals.

The individual's job is to optimize use of available resources within physical and social-economic constraints. They can place value on conservation or be environmentally friendly but short-term realities can over-ride long-term goals.

Society provides many constraints with regards to the use of resources. Society also wrestles with short term and long-term "goals" which can be in conflict with individuals "goals". Changes in information and technology also impacts what may once have been considered beneficial.

Dilemma: Reduce water withdrawals while minimizing socioeconomic impacts.

One proposed solution: Shift from mostly grains to forages to support and expand livestock industries.

Dilemma: Current levels of forage production may already be near sustainable levels.

Comment: Shifts to less usage while minimizing economic impacts are desirable.

Dilemma: Reduce water withdrawals while minimizing socioeconomic impacts.

One proposed solution: Shift from mostly grains and forages to industrial uses – such as energy production.

Example: 260 irrigated quarters purchased to supply water needs of new power plants.

Comment: Shifts to less water usage while increasing economic impacts.

Other possibilities?

- Higher value crops options, such as food crops or energy crops.
- Bio – energy business
- Wind energy
- Solar energy
- Wind and water ⇨ hydrogen production

The Good Ole' Days

- In 1787 farmers:
  - Seldom fertilized
  - Seldom rotated crops
  - Little interest in improved varieties
- Results:
  - Yield: Wheat 15 bu/ac, Corn 25 bu/ac
  - Labor: Wheat -373 hours/100 bushels, Corn- 344 hours/100 bushels
  - Cost ($8.00/hour labor): Wheat-$29.83/bu, Corn- $27.52/bu

K-State Extension Irrigation Projects

- Computer Software including: KanSched, FuelCost, CP Uniformity, Crop Water Allocator (CWA), Water Quiz Master
- MIL computer lab for hands-on computer training
- Kansas Water Trailer (Water Quiz)
- Center Pivot Uniformity Evaluation
- Field Demonstrations
- Educational Meetings and Programs
- Educational Materials
- SDI Technical Assistance, Survey and In-field Design Performance Evaluation

K-State Extension Irrigation Center Pivot Projects

- Above-canopy (IrriGage) Uniformity Evaluation
- In-canopy Design Performance Evaluation
- Crop Water (KanSched) Budgets (Center Pivot Ring Tests and Multiple Crops)
- Kansas Center Pivot Nozzle Package Survey
- Center Pivot Package Intensity of Application Evaluation
- Pressure Regulator Performance Evaluation
- Impact of Nozzle Type on Soil Infiltration

IRRIGATION MANAGEMENT SERIES

Kansas Center Pivot Survey

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Introduction

A road survey of center pivot irrigation systems was conducted in select counties across Kansas on two separate occasions. A county road map for the selected counties was divided into three north/south transects and three east/west transects. The survey was conducted in the fall of 2003 in Barton, Edwards, Pawnee, and Stafford counties. The counties surveyed in 2006 were Finney, Ford, Grant, Gray, Haskell, Scott, Stevens and Thomas. The surveyed counties are highlighted in Figure 1.

The purpose of the survey was to obtain information to characterize the types of center pivot nozzle packages in use. The survey information consisted of observations on field location, degree of rotation, number of spans, nozzle type, pressure regulation, general nozzle type, nozzle height, number of spans and overhang, outlets on overhang, and end gun presence and type. Since the surveyor made observations from the road and not directly from the ., the exact type of nozzle packages could not be determined. Therefore, they were generally characterized as impact sprinklers, fixed plate nozzles, or moving plate nozzles, which were recognizable configurations. Example nozzle package configurations are shown in Figures 2 through 5.

The results of the survey are presented in two groups: the south central survey and the western survey.

South Central Kansas Center Pivot Survey Results

The summary of observations from the south central region of Kansas is shown in Table 1a-g. Most of the 325 systems that were observed were typical quarter section center pivots (Table 1a), and 95 percent of those systems could make a complete revolution, as shown in Table 1b. The most common type of nozzle package in the area was moving plate nozzles (rotator, I-wobbler, etc), as outlined in Table 1c,

Tables 1a-g: Summary of Pivot Nozzle Package Survey for Barton, Edwards, Pawnee and Stafford counties in 2003

Table 1a: Survey Results on the Number of Spans for Center Pivot Systems in South Central Kansas

Number of Spans	4	5	6	7	8	9	10	11	18	Unknown
Number of Observations	1	3	11	106	133	12	28	1	1	1
Percentage	< 1	< 1	3.4	32.6	40.9	3.7	17.8	< 1	< 1	< 1

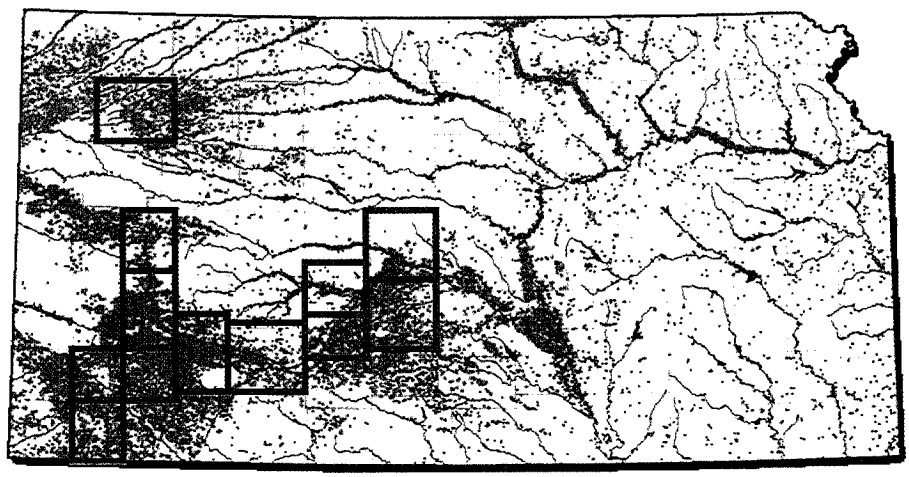

Figure 1. Kansas map showing the counties surveyed in south central Kansas in 2003 (green outlines) and western Kansas in 2006 (red outlines). The dots indicate irrigation points of diversion. *(Map courtesy of the KDA Division of Water Resources)*

19-26

and [illegible] half of the known systems were pressure regulated, as shown in Table 1d.

Observations on the nozzle spacing and heights were divided into three height categories and five height locations. Table 1e reveals that the most common nozzle spacing was medium (8-12 feet), and Table 1f shows that the most common nozzle height was a mounting just below the center pivot truss.

The observations of primary interest for this region were the number of end guns used on the center pivot systems. Table 1g reveals that more than one-third (37.5 percent) of the systems were equipped with a big gun, or traditional end gun, which requires a booster pump. On the other hand, 48.9 percent of the systems were equipped with either double or single large impact sprinklers, which are pressurized by using existing system pressure. Almost 13 percent of the systems did not have a different nozzle at the outer end as compared to the rest of the center pivot system.

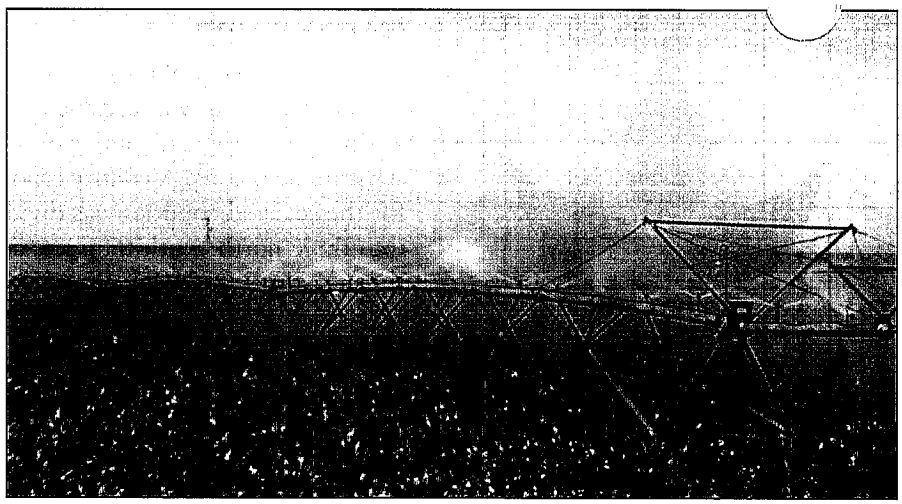

Figure 2: Center pivot equipped with impact sprinklers. *(Photo courtesy of Nelson Irrigation Corporation)*

Table 1b: Survey Results on the Degree of Rotation for Center Pivot Systems in South Central Kansas

Degree of Rotation	Number of observations	Percent of total
Full Circle	309	95
Partial Circle	16	5
Total	325	100

Table 1c: Survey Results of the Types of Sprinkler Nozzles on Center Pivot Systems in South Central Kansas

Nozzle Type	Number of observations	Percentage of all observations	Percentage of Known Observations
Fixed Plate	19	5.8	6.6
Impact	22	6.8	7.6
Mixed	5	1.5	1.7
Moving Plate	244	75.1	84.1
Unknown	35	10.8	Total known = 290

Table 1d: Survey Results on Pressure Regulators for Center Pivot Systems in South Central Kansas

Pressure Regulators	Number of observations	Percentage of all observations	Percentage of Known Observations
Yes	90	27.7	49.7
No	91	28	50.3
Unknown	144	44.3	-
Total	325	100	Total Known = 181

Table 1e: Survey Results of Nozzle Spacing for Center Pivot Systems in South Central Kansas

Nozzle Spacing	Number of observations	Percent of total
Close (< 8 feet)	64	19.7
Medium (8-12 feet)	187	57.5
Wide	66	20.3
Unknown	8	2.5

Table 1f: Survey Results of Nozzle Height for Center Pivot Systems in South Central Kansas

Nozzle Height	Number of observations	Percent of total
< 4 feet above ground	25	7.7
> 4 feet above ground	42	12.9
Truss to 2 feet below truss	221	68
Within truss	1	0.3
Top of pivot	27	8.3
Unknown	8	2.5

Table 1g: Survey Results of End Gun Type for Center Pivot Systems in South Central Kansas

End Gun Type	Number of observations	Percent of total
Big Gun	122	37.5
Double Large Impact	78	24.0
None	42	12.9
Single Large Impact	81	24.9
Unknown	2	<1

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Wes n Kansas Center Pivot Survey Results

The total number of systems observed in the western Kansas survey was 659. Center pivots larger then the typical quarter section system are more common in western Kansas, so the survey results of the number of spans ranged from four to 19, as shown in Table 2a. Out of the total number of observations in western Kansas, 483 were either seven or eight spans in length, and only 10 systems were less than 6 spans long. Seventy-six systems were either nine or 10 spans long, and almost 15 percent of the observed systems were 15 spans or larger. Table 2b shows information on the degree of rotation for the systems and is shown by span length. Approximately 50 percent of the systems that were 11 spans or larger were operated as partial circles, as compared to about 7 percent for systems of 10 spans or smaller.

Table 2c shows that 89 percent of the systems western Kansas are equipped with a fixed plate nozzle package and 78 percent of the systems were pressure regulated (Table 2d). Observations were also made on the placement of the nozzle for both spacing and height, as shown in Tables 2e and 2f. The most common observation was a mixed spacing configuration, which means that the first several spans had wider spacing then the outer spans. Only three systems were observed to have wide spacing. The majority of the systems were shown to use drop nozzles located at less then a 4-foot height, followed by systems that had heights above 4 feet but more then 2 feet below the truss. End guns, defined either as traditional big guns or impact sprinklers, accounted for only slightly more then 15 percent of the systems, as shown in Table 2g.

Tables 2a-g: Summary of Pivot Nozzle Package Survey for Finney, Ford, Grant, Gray, Haskell, Scott, Stevens and Thomas counties in 2005 and 2006

Table 2a: Survey Results on the Number of Spans for Center Pivots in Western Kansas

Number of Spans	Number Observed	Percentage
4	1	<1
5	2	<1
6	10	1.5
7	276	41.9
8	207	31.4
9	26	3.9
10	50	7.6
11	1	<1
12	2	<1
13	4	<1
14	4	<1
15	6	<1
16	28	4.2
17	20	3.0
18	16	2.4
19	6	<1

Table 2c: Survey Results of the Types of Nozzles for Center Pivot Systems in Western Kansas

Nozzle Type	Number	Percentage
Fixed Plate	589	89.4
Moving Plate	62	9.4
Impact	2	<1
Mixed	1	<1
Unknown	5	<1

Table 2d: Survey Results of Pressure Regulation for Center Pivot Systems in Western Kansas

Pressure Regulation	Number	Percentage
Yes	515	78.1
No	136	20.6
Unknown	8	1.3

Table 2e: Survey Results of Nozzle Spacing for Center Pivot Systems in Western Kansas

Nozzle Spacing	Number	Percentage
Close (< 8 feet)	214	32.5
Medium (8-12 feet)	197	29.9
Mixed	245	37.2
Wide	3	<1

Table 2b: Survey Results on the Degree of Rotation for Center Pivots in Western Kansas by span length

Number of Spans	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Total
Number Observed	1	2	10	276	207	26	50	1	2	4	4	6	28	20	16	6	659
Number of Partial Circles	1	0	2	18	19	2	1	1	1	0	2	4	14	11	10	1	87
Percentage Partial, by Number of Spans	100	0	20	6.5	9.2	7.7	2.0	100	50	0	50	66.7	50.0	55.0	62.5	16.7	13.2

19-28

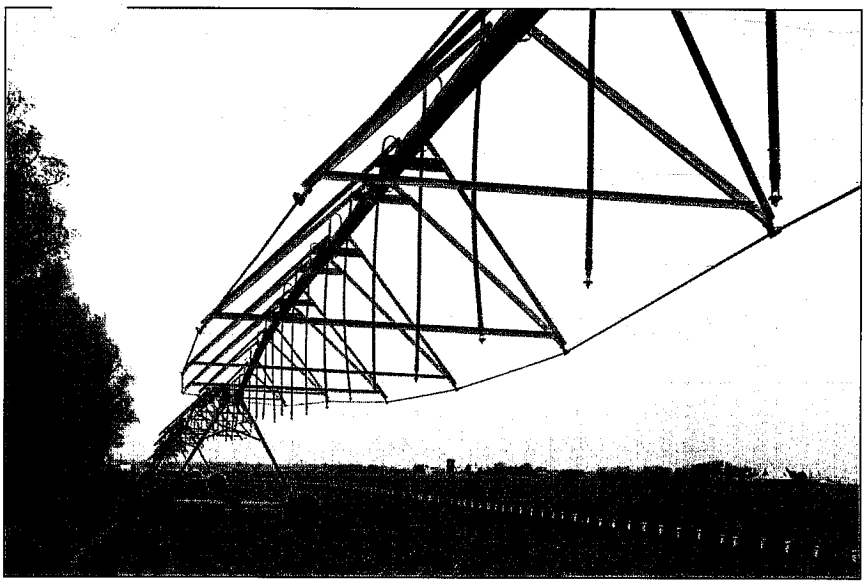

Figure 3: Center pivot equipped with moving plate nozzles mounted near truss height.

the fixed plate nozzles. Approximately [illegible]-fourths of the fixed plate nozzles used a mixed spacing configuration. Sixty-one percent of the moving plate nozzles use medium spacing, and another 10 percent fit into the mixed spacing category.

The large center pivots, which have a greater number of spans, are more likely to be associated with partial rotations. For systems with 11 spans or less, only 7 percent did not have full rotation. For span numbers greater then 11, approximately half of the systems could do full circles. These results are expected, due to the likelihood of physical constraints in larger fields, water-right and land ownership constraints, and irrigation capacity issues for large systems.

Table 2f: Survey Results of Nozzle Height for Center Pivot Systems in Western Kansas

Nozzle Height	Number	Percentage
Less then 4 feet	385	58.4
Greater then 4 feet	212	32.2
Truss to 2 feet below	55	8.3
Within truss	4	<1
Top of lateral	3	<1

Table 2g: Survey Results of the Types of End Guns for Center Pivot Systems in Western Kansas.

End Gun Type	Number	Percentage
Big gun	7	1.0
Single large impact sprinkler	22	3.3
Double large impact sprinkler	73	11.1
None (Last nozzle same type as system)	557	84.6

Additional analysis looked at various combinations of observations. Table 3 shows nozzle type versus nozzle spacing. Table 4 outlines nozzle height versus nozzle type. Table 5 compares nozzle height and nozzle spacing. Ninety percent of the observed systems for western Kansas had nozzles which were placed in the two lower placement categories: "less than 4 feet" or "greater than 4 feet but less then 2 feet below truss." Sixty-three percent of all fixed plate nozzles were within 4 feet of the ground, while only 12 percent of moving plate nozzles fit that category. Sixty-two percent of the moving plate nozzles were observed in the "greater than 4 feet" category, as compared to 29 percent of the fixed plate nozzles.

Observation results revealed that moving plate nozzles tend to use higher and wider spacing configurations than

Table 3: Center Pivot Survey Results for Nozzle Type and Nozzle Spacing for Western Kansas

Nozzle Type	Nozzle Spacing	Total
Fixed plate	Close (< 8 feet)	196
	Medium (8-12 feet)	155
	Wide (> 12 feet)	1
	Mixed	237
Fixed plate total		**589**
Impact	Close (< 8 feet)	0
	Medium (8-12 feet)	0
	Wide (> 12 feet)	2
Impact total		**2**
Mixed	Medium (8-12 feet)	1
Mixed total		**1**
Moving plate	Close (< 8 feet)	18
	Medium (8-12 feet)	38
	Mixed	6
Moving plate total		**62**
Unknown	Medium (8-12 feet)	3
	Mixed	2
Unknown total		**5**

19-29

Table .nter Pivot Survey Results for Nozzle Height and Nozzle Spacing for Western Kansas

Nozzle Height	Nozzle Spacing	Total
< 4 feet	Close (< 8 feet)	131
	Medium (8-12 feet)	41
	Mixed	213
< 4 feet total		**385**
> 4 feet above ground	Close (< 8 feet)	64
	Medium (8-12 feet)	118
	Wide (> 12 feet)	29
	Mixed	1
> 4 feet above ground total		**212**
Truss to 2 feet below truss	Close (< 8 feet)	18
	Medium (8-12 feet)	35
	Mixed	2
Truss to 2 feet below truss total		**55**
Within truss	Close (< 8 feet)	1
	Medium (8-12 feet)	2
	Mixed	1
Within truss total		**4**
Top of pivot	Medium (8-12 feet)	1
	Wide (> 12 feet)	2
Top of pivot total		**3**

Table 5: Center Pivot Survey Results for Nozzle Height and Nozzle Type for Western Kansas

Nozzle Height	Nozzle Type	Total
< 4 feet	Fixed plate	371
	Moving plate	12
	Mixed	2
< 4 feet total		**385**
> 4 feet above ground	Fixed plate	183
	Moving plate	27
	Unknown	2
> 4 feet above ground total		**212**
Top of pivot	Impact	2
	Fixed plate	1
Top of pivot total		**3**
Truss to 2 feet below truss	Fixed plate	41
	Moving plate	13
	Mixed	1
Truss to 2 feet below truss total		**55**
Within truss	Fixed plate	4
Within truss total		**4**

Figure 4: Center pivot equipped with moving plate nozzles mounted near truss height and end gun.

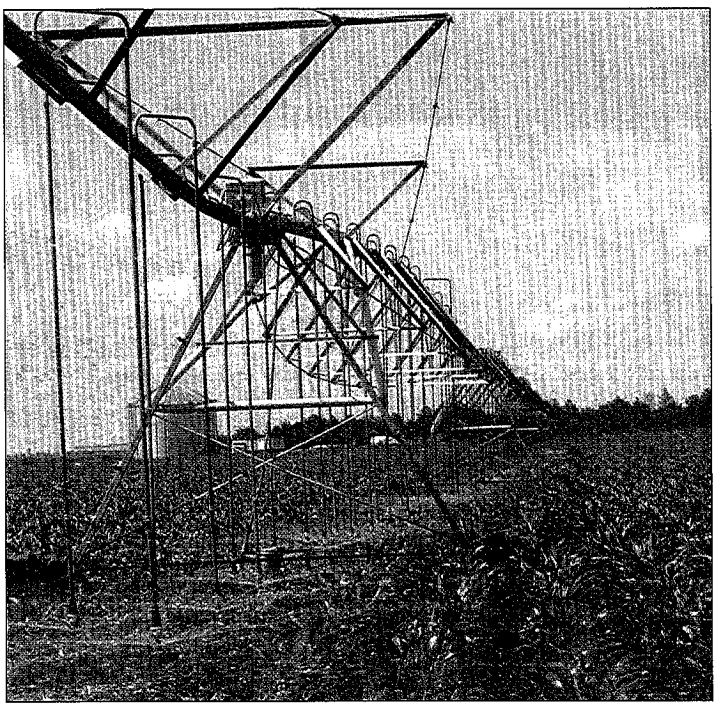

Figure 5: Center pivot equipped with fixed plate nozzles with pressure regulators mounted on drop nozzles at a low height.

19-30

Table enter Pivot Survey Results for Nozzle Spacing, Nozzle Height, and Nozzle Type

Nozzle Spacing	Nozzle Height	Nozzle Type	Total
Close (< 8 feet)	< 4 feet	Fixed plate	126
		Moving plate	5
		< 4 feet total	131
	> 4 feet above ground	Fixed plate	55
		Moving plate	9
		> 4 feet total	64
	Truss to 2 feet below truss	Fixed plate	14
		Moving plate	4
	Truss to 2 feet below truss total		18
	Within truss	Fixed plate	1
		Moving plate	0
		Within truss total	1
Close (< 8 feet) total			**214**
Medium (8-12 feet)	< 4 feet	Fixed plate	36
		Moving plate	5
		< 4 feet total	41
	> 4 feet above ground	Fixed plate	90
		Moving plate	26
		Unknown	2
	> 4 feet above ground total		118
	Truss to 2 feet below truss	Fixed plate	26
		Moving plate	7
		Mixed	1
		Unknown	1
	Truss to 2 feet below truss total		35
	Within Truss	Fixed plate	2
		Moving plate	0
		Within truss total	2
	Top of pivot	Fixed plate	1
		Top of pivot total	1
Medium (8-12 feet) total			**197**

Nozzle Spacing	Nozzle Height	Nozzle Type	Total
Mixed spacing	< 4 feet above ground	Fixed plate	209
		Moving plate	2
		Unknown	2
		< 4 feet total	213
	> 4 feet above ground	Fixed plate	26
		Moving plate	3
	> 4 feet above ground total		29
	Truss to 2 feet below truss	Fixed plate	1
		Moving plate	1
		Mixed	0
	Truss to 2 feet below truss total		2
	Within truss	Fixed plate	1
		Moving plate	0
	Truss to 2 feet below truss total		1
Mixed spacing total			**245**
Wide (>12 feet)	> 4 feet above ground	Fixed plate	1
	Top of lateral	Impact	2
Wide (>12 feet) total			**3**

A three-way observation of nozzle spacing, nozzle height, and nozzle type is shown in Table 6. Fixed plate nozzles are usually spaced closer and lower to the ground then moving plate nozzles, as is necessary because of the operational characteristics of the two nozzle types. Moving plate nozzles are most commonly used with medium spacing in the "greater than 4 feet" height category.

19-31

Regional Survey Comparisons, Contrasts

The south central and western Kansas results were similar in that both regions predominately used systems with lengths of seven or eight spans. Approximately 21 percent of the systems in either region had span lengths of eight or greater. However, in the south central region only two systems were greater than 10 spans in length, whereas 13 percent of the western systems were greater than 10 spans. These results are expected since the sandy soils of the south central area require systems that have a higher irrigation capacity to achieve the same irrigation reliability as compared to western Kansas systems that serve soils with higher water holding capacity. High irrigation capacity for large systems is problematic because of friction losses in the main lateral and limitations of well capacity. In addition, more of the south central systems (95.1 percent) completed full circles than the western systems (86.6 percent), although this trend is likely related to the number of larger systems in the west.

The most common type of center pivot nozzle package in the south central survey was a moving plate type nozzle, as compared to the fixed plated nozzle package in western Kansas. Higher capacity systems and sandy soils both make the use of moving plate nozzles and higher nozzle placement a preferred design selection for the general soils and slopes of south central Kansas.

End guns are commonly used on center pivot systems in south central Kansas. Only about 13 percent of the systems in south central Kansas did not have some type of end gun nozzle. On the other hand, only 15 percent of western Kansas systems used some type of end gun. More than one-third (37.5 percent) of the south central systems were equipped with a big gun (traditional end gun), and about half (48.9 percent) were equipped with either a double or single large impact sprinkler configuration.

Summary

The dominant center pivot nozzle package of western Kansas is a fixed plate nozzle positioned near to the ground using a drop tube as compared to a moving plate nozzle positioned near truss height in south central Kansas.

Acknowledgements

This work was supported in part by Kansas Water Plan Funds in support of the Mobile Irrigation Lab Project and the USDA-ARS Ogallala Aquifer Project.

19-32

Authors
Danny Rogers, Mahbub Alam and L. Kent Shaw

This work was supported in part by Kansas Water Plan Funds in support of the Mobile Irrigation Lab project and the USDA-ARS Ogallala Aquifer Project.

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In each case, credit Danny Rogers, Mahbub Alam, L. Kent Shaw, *Kansas Center Pivot Irrigation Survey,* Kansas State University, April 2009.

Kansas State University Agricultural Experiment Station and Cooperative Extension Service 19-33
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KANSAS
DEPARTMENT OF AGRICULTURE

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Joshua Svaty, Secretary

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Presentation on H. Sub. SB 316
to
The Interim Committee

by Lane P. Letourneau, L.G
Water Appropriation Program Manager
Kansas Department of Agriculture

October 8, 2010

Chairman McGinn and members of the committee, I am Lane Letourneau, program manager for the Water Appropriation program within the Department of Agriculture's Division of Water Resources.

We administer the Kansas Water Appropriation Act, which dedicates the use of our state's water for the benefit of all Kansans. It is our guide to water allocation and it allows us to regulate water use in the state. The act gives the chief engineer authority to approve an appropriation right to start using water for a beneficial purpose. Once the right is developed, it becomes a private property right.

I was asked to come here today to report on implementing House Substitute for Senate Bill 316, which was passed last session. H. Sub. SB 316 modified KSA 82a-718, the statute that requires that all water appropriations be for a beneficial purpose. That statue also says that every water right of every kind will be deemed abandoned and will terminate when the water is not used for its beneficial purpose for five successive years, unless there is due and sufficient cause for that nonuse.

H. Sub. SB 316 allows an exception to abandonment if:

- the water right is for groundwater;
- the water right is located in an area closed to new appropriation, either by rule, regulation or order; and
- the means to divert the water for beneficial use are available within a reasonable time.

This exception is in addition to the due and sufficient causes for nonuse listed in KAR 5-7-1. We keep it in mind as we review files with nonuse issues, but we haven't found one yet that qualifies for the new exception.

KSA 82a-718 requires that we send notice by certified mail to all landowners with three successive years of nonuse. This notice alerts the landowner that his or her water right is at risk of forfeiture if nonuse continues and there is no due and sufficient cause for that nonuse. The

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landowner can compare his or her reason for nonuse with KAR 5-7-1 or resume authorized beneficial use of water. We mailed 714 notices under this provision last year.

Last fiscal year we reviewed 124 files with status questions, and we prepared 19 verified reports. We have conducted six hearings so far this year. Of that six, only one landowner attended a hearing. Separate from these files, we processed 142 voluntary dismissals last year.

Contents:

- Abandonment Statute K.S.A. 82a-718
- Due and Sufficient Cause for Nonuse K.A.R. 5-7-1
- Examples of Recently Abandoned Files

DWR Process for Abandonment Cases:

- Annual Notice of Nonuse by Certified Mail After Three Years of Nonuse (Required by K.S.A. 82a-718)
- 30-Day Letter
- Draft Verified Report
- Verified Report
- Abandonment Hearing - Independent Hearing Officer
- KAPA Appeal Process
- District Court

Final Comment:

We are drafting a regulation to define a reasonable time to put water to beneficial use. It is complicated because we will have to refine it for each beneficial use.

Examples: Irrigation = In time to save a crop
Municipal = Before water tower is empty
Stockwatering = Before moving livestock

We are still working on the proposed regulation, but it should be ready for review and public comment by November 1, 2010.

K.S.A. 82a-718

Abandonment of water rights; notices; hearing; review of action; exceptions.

(a) All appropriations of water must be for some beneficial purpose. Every water right of every kind shall be deemed abandoned and shall terminate when without due and sufficient cause no lawful, beneficial use is henceforth made of water under such right for five successive years. Before any water right shall be declared abandoned and terminated the chief engineer shall conduct a hearing thereon. Notice shall be served on the user at least 30 days before the date of the hearing. The determination of the chief engineer pursuant to this section shall be subject to review in accordance with the provisions of K.S.A. 2005 Supp. 82a-1901, and amendments thereto.

The verified report of the chief engineer or such engineer's authorized representative shall be prima facie evidence of the abandonment and termination of any water right.

(b) When no lawful, beneficial use of water under a water right has been reported for three successive years, the chief engineer shall notify the user, by certified mail, return receipt requested, that:

(1) No lawful, beneficial use of the water has been reported for three successive years;

(2) if no lawful, beneficial use is made of the water for five successive years, the right may be terminated; and

(3) the right will not be terminated if the user shows that for one or more of the five consecutive years the beneficial use of the water was prevented or made unnecessary by circumstances that are due and sufficient cause for nonuse, which circumstances shall be included in the notice.

(c) The provisions of subsection (a) shall not apply to a water right that has not been declared abandoned and terminated before the effective date of this act if the five years of successive nonuse occurred exclusively and entirely before January 1, 1990. However, the provisions of subsection (a) shall apply if the period of five successive years of nonuse began before January 1, 1990, and continued after that date.

(d) Notwithstanding the provisions of subsection (a), a groundwater right, which has as its local supply an aquifer area that has been closed to new appropriations by rule, regulation or order of the chief engineer and where means of diversion are available to put water to a beneficial use within a reasonable time, shall be deemed to have due and sufficient cause for nonuse and shall not be deemed abandoned.

(History: L. 1945, ch. 390, § 19; L. 1957, ch. 539, § 23; L. 1988, ch. 356, § 350; L. 1999, ch. 122, § 1; L. 1999, ch. 149, § 13; July 1; L. 2010, ch 59, § 1, July 1.)

K.A.R. 5-7-1
Due and sufficient cause for nonuse

(a) Each of the following circumstances shall be considered "due and sufficient cause," as used in K.S.A. 82a-718, and amendments thereto:

(1) Adequate moisture from natural precipitation exists for the production of grain, forage, or specialty crops, as determined by the moisture requirements of the specific crop.

(2) A right has been established or is in the process of being perfected for use of water from one or more preferred sources in which a supply is available currently but is likely to be depleted during periods of drought.

(3) Water is not available from the source of water supply for the authorized use at times needed.

(4) Water use is temporarily discontinued by the owner for a definite period of time to permit soil, moisture, and water conservation, as documented by any of the following:

(A) Furnishing to the chief engineer a copy of a contract showing that land that has been lawfully irrigated with a water right that has not been abandoned is enrolled in a multiyear federal or state conservation program that has been approved by the chief engineer;

(B) enrolling the water right in the water right conservation program in accordance with K.A.R. 5-7-4; or

(C) any other method acceptable to the chief engineer that can be adequately documented by the owner before the nonuse takes place.

(5) Management and conservation practices are being applied that require the use of less water than authorized. If a conservation plan has been required by the chief engineer, the management and conservation practices used shall be consistent with the conservation plan approved by the chief engineer to qualify under this subsection.

(6) The chief engineer has previously approved the placement of the point of diversion in a standby status in accordance with K.A.R. 5-1-2.

(7) Physical problems exist with the point of diversion, distribution system, place of use, or the operator. This circumstance shall constitute due and sufficient cause only for a period of time reasonable to correct the problem.

(8) Conditions exist beyond the control of the owner that prevent access to the authorized place of use or point of diversion, as long as the owner is taking reasonable affirmative action to gain access.

(9) An alternate source of water supply was not needed and was not used because the primary source of supply was adequate to supply the needs of the water right owner.

(10) The chief engineer determines that a manifest injustice would result if the water right were deemed abandoned under the circumstances of the case.

(11) The water right is located in an area of the state that is closed to new appropriations of water by regulation or order of the chief engineer but is not closed by a safe-yield analysis.

(b) In addition to circumstances considered due and sufficient cause pursuant to subsection (a), both of the following requirements shall also be met to constitute due and sufficient cause for nonuse of water:

(1) The reason purporting to constitute due and sufficient cause shall have in fact prevented, or made unnecessary, the authorized beneficial use of water.

(2) Except for the temporarily discontinued use of water as provided by paragraph (a)(4) and for physical problems with the point of diversion or distribution system as provided by paragraph (a)(7), the owner shall maintain the diversion works in a functional condition.

(c) Each year of nonuse for which the chief engineer finds that due and sufficient cause exists shall be considered to interrupt the successive years of nonuse for which due and sufficient cause does not exist.

(d) When a verified report of the chief engineer, or the chief engineer's authorized representative, is made a matter of record at a hearing held pursuant to K.S.A. 82a-718, and amendments thereto, that establishes nonuse of a water right for five or more successive years, the water right owner shall have the burden of showing that there have not been five or more successive years of nonuse without due and sufficient cause.

(Authorized by K.S.A. 82a-706a;implementing K.S.A. 82a-706a and K.S.A. 2009 Supp. 82a-718; modified, L. 1978, ch. 460, May 1, 1978; amended May 1, 1986; amended May 31, 1994; amended Oct. 24, 2003; amended May 21, 2010.)

20-6
06 02 2010 15

20-7

Duane Pauls
P.O. Box 75
Johnson, Ks 67855

Division of Water Resources

Mike Meyer

2406 Johns

Garden City, KS

RECEIVED
JAN 19 2010
Garden City Field Office
Division of Water Resources

Dear Mr. Meyer

I received the letter dated December 31, 2009 from Division of Water Resources concerning water file#23124.

I started farming this farm in 1998. At that time the four wells on this farm pumped 1350gpm total which was sufficient to grow two circles of corn as well as alfalfa, milo, and wheat.

After the wells declined to 900gpm total,I decided in 2002 to only grow one circle of corn, as well as wheat and milo. At that time I didn't need all four wells to grow one circle of corn, so I quit using this well which is the smallest and least efficient . I pulled the pump to stop the deterioration and rusting. At this time I have an irrigation motor, pump and bowl stored and ready to install in a short time if the well is needed. All underground water lines, gas supply and water meter remain intact.

In 2009 the circle of corn yielded 265 bushels per acre,and an additional circle of milo yielded 105 bushels per acre, so additional water was not needed.

Please determine the status of water file # 23124 so that I may plan for the future.

Thank you for your consideration,

Duane Pauls

20-9

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Joshua Svaty, Secretary

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Testimony on Conservation as a Beneficial Use of Water
to
The Joint Committee on Energy and Environmental Policy

By Burke Griggs
Kansas Department of Agriculture
Division of Water Resources
October 8, 2010

Good morning, Chairman McGinn and members of the committee. I am Burke Griggs, a lawyer for the Division of Water Resources. I am here to recommend that you recognize conservation as a beneficial use of water.

In 1944, the Kansas Supreme Court ruled that Kansas water law was ineffectual, which meant that Kansas, unlike the other 17 western states, was without an effective, legal way to appropriate water and to perfect water rights. The Legislature responded by enacting the Water Appropriation Act, one of the most progressive water law codes in the west at that time. Seven decades later, we face a similar situation. Kansas does not have an effective way to keep water rights secure and conserve water at the same time. Given the declines in our water supply statewide, the value of water rights and the structure of the Water Appropriation Act, it is time to recognize conservation as a beneficial use.

Establishing conservation as a beneficial use under Kansas law would require four elements as set forth by the original Senate Bill 510 introduced last session. First, it would define "conservation use" as "the keeping of a water right for future use." Second, it would codify conservation as a beneficial use of water statewide, like all other recognized beneficial uses. Third, it would prohibit water diversion under conservation use. Finally, it would guarantee that the owner of a water right can change to and from conservation use using existing law and procedure. Establishing conservation as a beneficial use provides property right protections previously unavailable while conserving water at the same time.

The Water Appropriation Act has two longstanding provisions that allow conservation, but they are limited to the chief engineer alone. The first is for minimum desirable streamflows, where the chief engineer withholds water from appropriation to protect streams from running dry. The minimum desirable streamflow provision has been a success. The second enables the chief engineer to hold water rights in custody for conservation. However, because this provision requires the owner to permanently transfer his right to the state, no owner has done so. The Division of Water Resources supports extending the power to conserve water to water right owners, so they can determine their own destiny with regard to their property, using long-established laws and procedures of the Water Appropriation Act.

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If a water right owner does not use water for five years, he risks forfeiting his right: this is the "use it or lose it" rule. DWR regulations contain many exceptions that can temporarily delay forfeiture, but these regulations can be cancelled. The Water Rights Conservation Program provided one such exception, but it was cancelled last year, demonstrating how tenuous these regulatory exceptions are. Last year's Senate Bill 316, enacted as K.S.A. 82a-718(d), provides an exception to forfeiture, but it is costly, it requires the owner to maintain diversion works, and it is limited to groundwater rights in the one-fifth of the state formally closed to new water rights. (See attached map).

Recognizing conservation as a beneficial use is a better approach. The owner can keep his water right for future use — much as a businessman would use money by keeping it in cash reserve — while protecting his property right from forfeiture and conserving water. Kansans have wrestled with the "use it or lose it" rule for a long time. How can a water right owner conserve water without putting his property rights at risk? The Water Rights Conservation Program and Senate Bill 316 merely postponed the need to address the problem. In contrast, conservation use solves the problem. It recognizes a permanent, real property right, which is consistent with the progress of Kansas water law since 1945, and it embraces the core statutes by which water rights are obtained, changed, transferred and declared abandoned.

Conservation use enhances a water right owner's property right. First, if the owner changes the beneficial use to conservation, he would not be required to maintain diversion works as currently required under 718(d). Second, he would not need to pump water simply to prevent abandonment, or to be engaged in other activities that are economically inefficient. Third, the owner's water right becomes much more marketable, meaning it can be bought, sold or leased instead of lost to abandonment, which should interest the more than 17,500 owners of vested and certified water rights for irrigation, industrial, municipal and other uses. Fourth, owners can leverage conservation rights to obtain federal money, as with the Water Rights Conservation Program, but in a more flexible way. Finally, such rights promise to benefit other water right owners by reducing groundwater drawdown and improving flows.

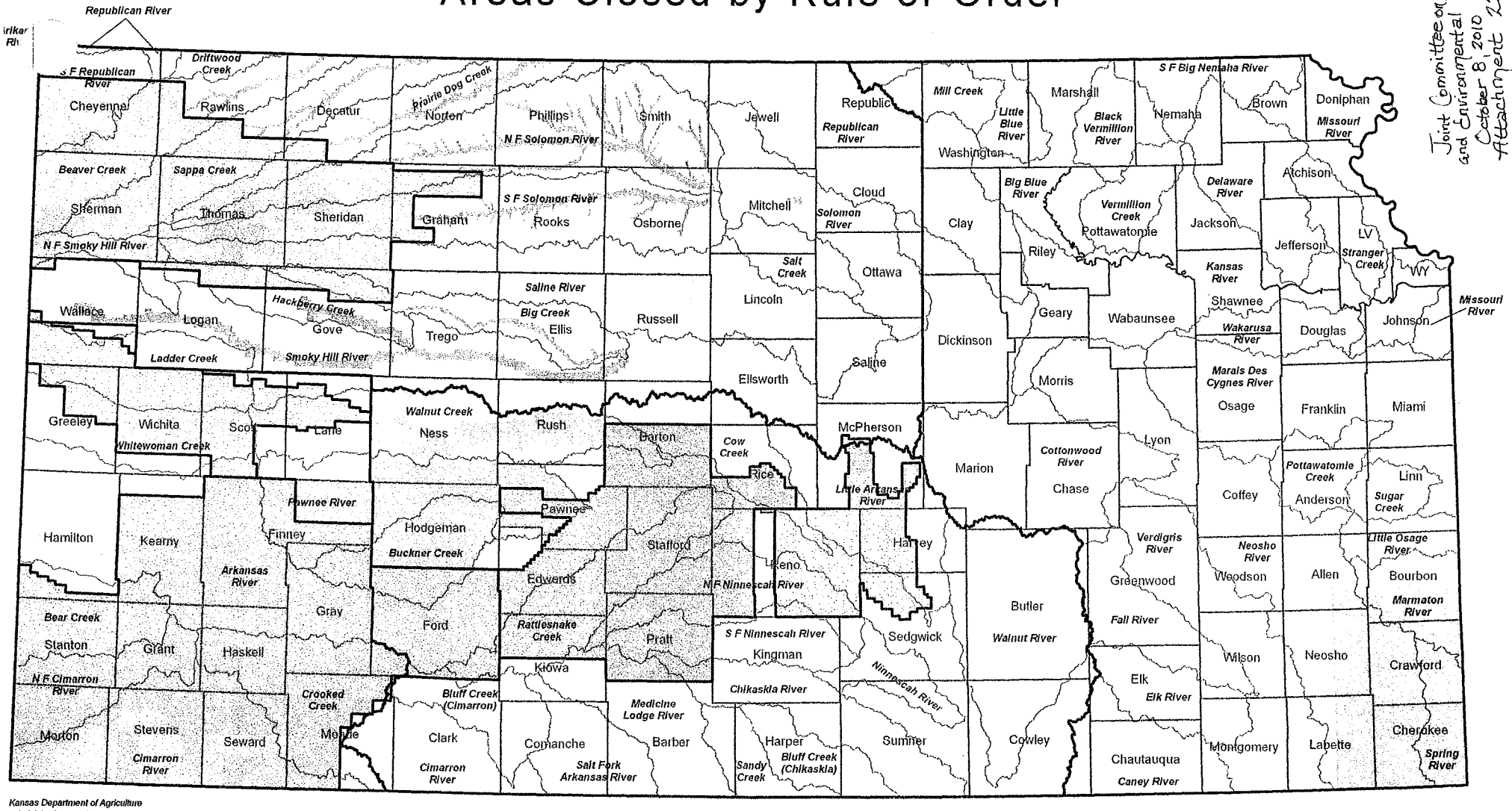
Conservation use should operate statewide, just like all other beneficial uses of water. The need for conservation is not limited to areas that are formally closed, and drought is never limited to closed areas. Kansas faces water shortages in every part of the state. Even in eastern Kansas, much of the surface water use is conditioned on available streamflow. Reservoir yields are decreasing due to siltation, while demands are increasing.

Conservation use will not promote hoarding. Under Senate Bill 510, only vested and certified rights can be converted to conservation use. Since existing procedures will govern changes to and from conservation use, the chief engineer will have discretion evaluating changes. Remember, too, that these are private property rights. If an owner decides that conservation use is in his interest, he should be allowed to conserve without state interference. In Kansas in 2010, water rights are simply too valuable to hoard. It simply doesn't make sense to, either economically or financially.

Recognizing conservation as a beneficial use builds on the tradition of Kansas water law: protecting property rights while adapting to changing realities. Earl Shurtz, one of our forefathers in water law, wrote, water law "must grow with the needs and changes of the society to which it applies." Conservation use expands the private property rights of the owner while promoting water conservation. Kansas, out waters and our society have changed, and our water law must mature to meet the ever-growing need for water conservation. I believe this legal maturity is needed, and Senate Bill 510's approach agrees with the history, structure and procedures of the Water Appropriation Act.

I will stand for questions at the appropriate time.

Areas Closed by Rule or Order



Kansas Department of Agriculture
Administrative Services, GIS
September 24, 2010

Legend

DWR Field Office Boundaries | Closed Areas | GMD Boundaries | County Boundaries | Dwrbasin

Joint Committee on Energy and Environmental Policy
October 8, 2010
Attachment 22

Testimony on SB 510

Joint Legislative Committee on Energy and Environmental Policy

Provided by: Paul Tobia,
Vice President, Kansas Water Congress,
Chair, Conservation Subcommittee

Kansas Water Congress Discussion of Senate Bill 510

Meeting of October 6, 2010-1:30pm

Madam Chair and members of the committee, Thank you for the opportunity to be here today and provide this report. The Kansas Water Congress is a non-profit fee funded entity separate and distinct from existing state agencies, associations, other organizations and direct political affiliation. The membership of the Kansas Water Congress comes from every watershed and represents every type of water user in the state and recognizes the necessity for the unity of purpose and objective in supporting the formation and execution of a stable water policy for a unified State of Kansas. In recognition that utilization of the State's limited water resources will determine the greatness which the State can attain in the future, the Congress is dedicated to the end that both commerce and conservation are key components to the responsible development, protection and management of our water resources.

The Kansas Water Congress recognizes the significant importance and need to achieve harmony between all water users, protection of our water resources plus the vital role played by our State Agencies in the development, conservation and protection of the water resources of our State.

In support of this, a meeting was held on October 6, 2010 to discuss the issues raised in Senate Bill 510. In attendance were representatives from the State Conservation Commission, Department of Agriculture and the Division of Water Resources, the Kansas Water Office, Groundwater Management Districts 1 through 5, Kansas Farm Bureau, Kansas Livestock Association, Kansas COOP Council and a Municipality representative. The meeting was a sub-committee of Kansas Water Congress State Affairs Committee.

Some highlights of the meeting:

1) There appeared to be consensus on the issues raised in 510 that stemmed from the end of the Water Rights Conservation Program.

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2) All believed that the conservation of water and the protection of water rights are laudable goals and need to be identified as such.

3) All recognized that fees to administer any programs in these tough economic times for our state may need to be in the mix.

4) All appeared to support the concept of more options for water users and water right holders while keeping to a minimum the burdens placed on state agencies as a desirable goal.

5) Any state wide program application needs to allow flexibility to address regional concerns and the differences encountered as we move across the state (In particular open vs. closed areas and closed by rule or by order).

6) Any option available to a user needs to be flexible enough to allow any future financial remuneration by a state or federal program.

7) Perhaps we should try to incorporate some of the concepts provided in the Water Right Conservation Program into any future bill.

8) Most water users had a comfort level with the contract concept in the Water right Conservation Program that is missing in 510.

In closing this was the first meeting held by the Sub-Committee of the Water Congress to bring together various stakeholders with the goal of developing consensus on the long and short term direction of water conservation while protection water rights in Kansas

Thank you for the opportunity to provide this report on the activity of the Congress. I'll stand for any questions the committee may have at the appropriate time.

Paul Tobia, Wichita

Vice President of Kansas Water Congress,

Chair of the Conservation Subcommittee.

Testimony RE: SB 510

JOINT COMMITTEE ON ENERGY AND ENVIRONMENTAL POLICY

Provided By:

Kansas Groundwater Management Districts No.'s 1, 2, 3, 4 and 5

October 8, 2010

SB 510

An ACT concerning water; relating to the beneficial use of water.

BACKGROUND:

With the elimination of the Water Rights Conservation Program (WRCP) at the end of 2009, and because conservation is so important, there was a flurry of Legislative activity in the 2010 session to address Kansas' conservation needs post WRCP.

As many of the primary players discussed the issues early in the process, most generally agreed that six issues were fundamental to a workable conservation replacement program - as follows:

1) a definite time period a water right could be enrolled;

2) a fee funded program design to address the agency funding issues;

3) the authority for the well owner to safely cap the well and store the equipment while enrolled;

4) eligibility only in closed areas where conservation most positively affects existing water rights, and, does not affect un-appropriated water;

5) certainty on behalf of the water right owner of the validity and extent of the water right both when entering and exiting the program; and

6) controlling administration calls by enrolled water right holders.

The 2010 formal activity included 2 Legislative and 1 agency proposals:

SB 510 H Sub for SB 316 Amended KAR 5-7-1

As the GMD's looked at each of these 3 alternatives, it was noted that each had its distinct advantages, but none addressed all 6 of the core issues cited above as important.

Very late in the 2010 Legislative session the GMD's discussed a 4th (blended) proposal with DWR, but due to a lack of time it was not able to be adequately pursued.

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As of today, the 2010 Legislature passed and enacted H Sub for SB 316, and DWR subsequently amended KAR 5-7-1 to add one more due and sufficient cause for nonuse.

CONCERNS & COMMENTS:

1. H Sub for SB 316 and the amended KAR 5-7-1 still do not address all six of the identified issues. In fact, these two bills together only address 3 of the six issues:

   2) the fees to do conservation are made non-applicable;

   3) the authority for the well owner to safely cap the well and store the equipment while enrolled;

   5) certainty on behalf of the water right owner of the validity and extent of the water right.

   The issue of being available only in closed areas is also addressed in H Sub for SB 316, but not completely in KAR 5-7-1.

2. Should SB 510 (as currently drafted and envisioned by DWR) be implemented on top what is already in place, no additional issues will be addressed. And in fact one of the issues already addressed by H Sub for SB 316 and KAR 5-7-1 will be unaddressed:

   5) certainty on behalf of the water right owner of the validity and extent of the water right.

RECOMMENDATIONS:

1) Since none of these bills address all six of the issues expressed above, even if all are passed, the Kansas GMDs recommend that SB 510 be passed in such a manner that addresses all six of the issues originally deemed important.

In order to do this, we recommend two steps:

a) SB 510 be passed in such a manner that can support one or more conservation programs that can be implemented by regulation, and which statutorily includes language to address at least the following three issues:

(1) "Conservation" shall be a beneficial use eligible in areas closed by regulation or order of the chief engineer; or within the boundaries of a groundwater management district at the recommendation of the district's board of directors; and

(2) certainty on behalf of the water right owner of the validity and extent of the water right when entering and coming out of the conservation program; and

(3) restrict the status of any administration call by a water right holder whose water right is in conservation status.

b) DWR regulations generated to implement SB 510 following its passage should address the three remaining issues:

(1) a definite time period a water right could be enrolled

(2) a fee funded program design to address the agency funding issues

(3) the authority for the well owner to safely cap the well and store the equipment while enrolled

With these three actions, and effective rule promulgation by DWR, Kansas will have a new beneficial use type of "conservation use" that supports the DWR proposed conservation alternative for water right holders which addresses all 6 of the identified issues.

In summary, based on various discussions it may be, in our opinion, the best approach at this time to implement a well-accepted WRCP-type program as one of the conservation tools as we all continue to work toward additional recommendations to address the issues of water conservation and water rights preservation in Kansas.

Testimony of Toby Dougherty, City Manager of Hays, Kansas

Joint Committee on Energy and Environmental Policy

Kansas Legislature

October 8, 2010

Conservation as a beneficial use of water

Issue

The City of Hays is advocating legislation that would include "conservation" as a beneficial use of water. This would allow holders of a perfected water right to enroll that right in conservation. The water would not be pumped while in conservation. This would protect the right holder from the "use it or lose it" provisions of the current law as the Division of Water Resources could not reduce or eliminate a right that is enrolled in conservation. The new law would benefit all water right holders. Cities and other water suppliers, as well as farmers, utilities, and industrial users would benefit tremendously from this legislation as it would allow for more adequate planning for future water needs.

The legislation

The general premise of this potential legislation is to establish a new beneficial use of water to be defined as "conservation use." This issue was brought to the forefront when the Department of Agriculture introduced SB 510 during the 2010 legislative session. This concept would allow the owner of a valid and perfected water right to place it in conservation, protecting the right for future use. It is anticipated similar legislation will be introduced during the 2011 Legislative Session.

Brief History of Water Law in Kansas

Kansas water law has been relatively stable since the passage of the Water Appropriation Act in 1945. The basic function of the law is that the water is dedicated to the use of the people of the state and that water rights are available to persons if they put the water to a beneficial use. There are 14 separate "beneficial uses" of water which include irrigation, domestic, stockwatering, municipal, industrial, etc. Under the current law, water rights can be forfeited if they are not used for five consecutive years without good reason. This rule is known as "use it or lose it." When conflicts between water rights arise the state law is based on first in time, first in right. That is, the priority of use is based on the age of the right. Older, or "senior" water rights have priority over newer, or "junior" rights in times of shortages allowing the owner of the senior right full benefit of the limited resource.

History of the "Conservation Use" Issue

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During the 2010 legislative session two bills were introduced that dealt with the general concept of non-use of water. HB 2565 was limited in scope and will be discussed in more detail later on. SB 510, heard in the Senate Natural Resources committee, contemplated adding a new beneficial use of water to be defined as a "conservation use." This bill was modeled on similar statutes in other western states, such as Texas, Colorado, Utah and California. It would allow an existing irrigation right, for example, to be changed to a conservation use. Once this change was approved the irrigator would no longer have to pump water to avoid the abandonment of his right. In fact, diversion of water would be prohibited from a conservation use water right. Nothing in SB 510 would prevent a conservation use right from being changed to a different beneficial use but it would still be subject to the normal change procedures in KSA 82a-708b.

Benefits of Change

The fundamental benefit of adopting a conservation use is that it would allow the water right owners, who are pumping simply to avoid abandonment, another method to preserve their valuable property right. Cities and other public water suppliers can purchase quality water rights as they come available, allowing them to more adequately plan for future needs without being forced to put the water into immediate service. Additionally it should result in more flexibility in future planning for individuals, energy and industrial users. Individuals will be able to pass rights to their heirs with less concern over abandonment.

If water users could participate in conservation where active pumping is not required it could preserve the long term viability of the state's depleted aquifers, potentially rejuvenate stream flow in certain areas, and reestablish riparian habitat.

Who would benefit from this legislation?

Anyone who owns a water right could potentially benefit from this legislation. This includes farmers, ranchers, cities, water suppliers, utilities, and industrial users.

Who supports this legislation?

In addition to many cities, this legislation is supported by the Kansas Water Office the Kansas Department of Agriculture and the Division of Water Resources.

Frequently Asked Questions

- *If water rights can be enrolled in conservation for a long period of time what would keep someone from hoarding water?*
    - If a person owned an extremely large number of water rights it would be possible to hoard a local supply for an extended time period. However in order to make this possible you'd have to assume that the value of water will escalate enough to outgrow both the net present value of money, as well as inflation, by a significant margin in order to return a

future profit. This was a consideration in recent years in Texas where an individual attempted to obtain enough water supplies to sell water to D/FW, San Antonio or El Paso. Even with such large population bases it has not proven to be a profitable endeavor. In Kansas, such an effort would be further complicated by the Kansas Water Transfer Act (KSA 82a-1501 et seq.) which limits the movement of large quantities of water over a long distance (more than 35 miles).

- If someone wanted to hoard water, they could do so at this time as there is nothing in the current Statutes that would prohibit it.

- In the current environment where most individuals own only a few water rights, it would be difficult if not impossible to hoard enough water to seriously impact the available supply. Without broad collaboration it would be difficult to tie up enough water to seriously impact the price.

- *What impact might this have on persons trying to obtain water rights?*
  - It is likely this legislation would have very little impact on those seeking new water rights. In open areas a person simply needs to locate an available source of supply and apply for a new right. In a closed area the abandonment of an existing water right could make water available, but in reality most closed areas are significantly overappropriated, and abandoning a few water rights would not bring the available water back above the safe yield formula.
  - For those seeking to purchase existing rights it would give them more flexibility in how/when to purchase water. They wouldn't be forced to purchase at the time of need, but rather could obtain water rights when they came available and save them for future use/planning without being forced to put them to active use in the interim period.

- *Will DWR reduce my rights if I place it in or take it out of conservation?*
  - No.

- *What would stop a city or water district from condemning my water and then placing it into conservation for decades?*
  - In general condemnation proceedings are used as a last resort due to the inherent conflict and expense. As a result it is unlikely that a city would resort to such an action for planning decades down the road. Some entities can clearly condemn water rights, while others cannot. SB 510 would not change that. That said, a city or water district would face a more difficult burden to show, in a condemnation proceeding, that it was necessary to condemn water rights that it planned to put into conservation use only, while not consuming that water for decades.

  - The proposed legislation allows for better planning. It is more likely that a city or water district would have to resort to condemnation in order to obtain water rights under the current laws.

- Was there legislation passed last year that allowed for non-use of a right in closed areas?

- HB 2565 (ultimately H Sub for SB 316) addressed non use in areas closed to new appropriations. In this case, any water right that is located in an area that is closed to new appropriations shall be deemed to have due and sufficient cause for non-use. As long as means of diversion are available to put the water to use if necessary the water right shall not be subject to abandonment. This bill ultimately passed as House Substitute for SB 316 and was signed into law.

- While this legislation does benefit water right holders in closed areas, it is not the optimal solution. The areas in question are closed because they are over appropriated or periodically there is not enough sustainable yield to satisfy all of the right in the area. In most cases, the water right owners is not pumping simply because there is not water available to pump. While it is true that a right holder can not have the right taken away for non use, the holder must keep the means of diversion in place to put the water to use. This could prohibit cities and other public water suppliers from purchasing rights for future use.

- *Isn't there a program that allows water holders to set them aside for five or ten years?*
  - The WRCP program which was introduced in 1992 did allow for this, but the program was eliminated last year due to budget constraints. A similar federal program EQIP is still recognized as a reason for non-use but is more limited in scope and individuals must apply and be accepted to participate. Both programs rely on federal dollars as water right owners are compensated for non-use.

- *Is it possible to limit the applicability of conservation use?*
  - *Areas close to new appropriation:* Areas can be "closed to new appropriation" in two ways: 1) by rule of the chief engineer; or 2) by being fully appropriated. Under the new law (H Sub SB 316), groundwater rights within areas closed by rule cannot be abandoned due to non-use as long as their point of diversion can divert water within a reasonable timeframe. Conservation use would not require the diversion works to be maintained. Fully appropriated areas not closed by rule do not have this protection.
  - *Caps on water quantity or time enrolled in conservation use:* While this may address the concern of individuals/entities hoarding water, it may seriously limit the ability of a municipality or others to plan far into the future. For example, the ability to secure and preserve a significant quantity of water for future use may be very beneficial to certain municipalities. In a declining aquifer, some water right holders may change water rights to conservation to slow the decline near their better wells. In areas of water quality concerns, water right holders may change water rights to conservation to better control the migration of poor quality or contaminated water.
  - *Limit conservation use only to right owned by municipalities:* We believe conservation of water is an important policy goal and should be available to citizens statewide. The current use it or lose it philosophy contributes to less efficient water use in many cases.

KANSAS LIVESTOCK ASSOCIATION

Since 1894

TESTIMONY

To: Joint Committee on Energy and Environmental Policy
Senator Carolyn McGinn, Chair

From: John Donley, Assistant General Counsel

Date: October 8, 2010

Re: Creating a conservation use water right

The Kansas Livestock Association (KLA), formed in 1894, is a trade association representing approximately 5,500 members on legislative and regulatory issues. KLA members are involved in many aspects of the livestock industry, including seed stock, cow-calf and stocker production, cattle feeding, dairy production, grazing land management and diversified farming operations.

Good morning Chairperson McGinn and members of the Committee. My name is John Donley, and I am Assistant General Counsel for the Kansas Livestock Association. I appreciate the opportunity to discuss SB 510 and, more importantly, the need to recognize and encourage water conservation practices.

KLA is generally supportive of measures that encourage water conservation practices. Under existing law, prior to the passage of SB 316 last year, if a water right owner had not made a lawful, beneficial use of the water at least one out of every five years, the water right was considered abandoned, and the owner of that right lost the water right. Therefore, there was an incentive to pump water even when it may not be necessary in order to avoid a determination by the Division of Water Resources (DWR) that the water right has been abandoned. Even after the passage of SB 316, this scenario still could take place in areas open to new appropriations.

SB 510 sought to recognize conservation use as a beneficial use. We are generally supportive of such efforts to recognize conservation practices. We did have some concerns with the bill as originally drafted. Those concerns were being addressed in discussions with DWR throughout the 2010 legislative session.

I appreciate the opportunity to testify before the committee in support of the concepts that were brought forward with the introduction of SB 510 as well as other proposed concepts that will encourage water conservation practices while also protecting the property rights of the owners of water rights. This is an issue that needs to continue to be analyzed, and good public policy developed, whether it is the language proposed in SB 510 or other proposed policy yet to be discussed by the Legislature. I would be happy to stand for questions at the appropriate time. Thank you.

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Energy & Environmental Policy Committee

October 8, 2010
Topeka, KS

Conservation of water as a beneficial use.

Thank you, Chairman McGinn and members of the Energy & Environmental Policy Committee, for the opportunity to comment today on water conservation issues. I am Leslie Kaufman, Executive Director for the Kansas Cooperative Council.

The Kansas Cooperative Council (KCC) represents all forms of cooperative businesses across the state -- agricultural, utility, credit, financial and consumer cooperatives. Approximately half of our members are grain elevator/farm supply cooperatives. In many areas of the state, especially the western portions of Kansas, our members rely on irrigated acres to produce the grain they will handle.

Additionally, agricultural operations, whether at the co-op level or their producer-owner level, are dependent on affordable fuel supplies. For many, that is electricity, and much of that in Kansas is generated and/or distributed by electric co-ops. Water is an integral component of that power generation. We know you have heard about that inter-relationship yesterday.

The KCC has been very vocal over the past several years regarding the need for water conservation options that do not precluded continued agricultural production, particularly crop production. We encourage the development of these types of water conservation initiatives that focus on water and the water right, rather than prohibiting certain land-use options.

Water conservation as a "beneficial use"
SB 510 (2010), considered this past session, would have allowed for the preservation of a water right under the Kansas "use it or lose it" appropriation system by statutorily recognizing "conservation use" as a specific "beneficial use". Thus, a right holder will not be "forced" to use water when s/he does not need to for the sake of the crop, simply to maintain an appropriated right. Instead, they could seek an official change of use for the right, stop using the water, but preserve the allocation right.

The Kansas Cooperative Council appeared in support of the bill as an example of conservation initiatives that did not require prescriptive land-use restrictions by prohibiting continued agricultural production. The ability to continue farming land once irrigation is curtailed is an important policy tenant for our association.

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For many years, a common concern with the Kansas water appropriation system's "use it or lose it" basis was the potential to almost "punish" those that have been judicious in water usage or have implemented water conservation initiatives, by reducing an appropriation based on "non-use". Regulatory mechanisms were put in place to try and mitigate this, but SB 510 would have provided a statutory alternative. A water right is a valuable property right, and preserving that full appropriation is of great worth to holders. Thus, establishing conservation as a "beneficial use" allows right-holders to save important water resources without fear of losing part or all of their allocation.

SB 510 was a more cost-effective means of addressing water conservation than other plans that have been proposed at various times. The cost estimate was extremely modest compared to certain water right "buy-out" plans of the past.

In its printed form, SB 510 was a relatively straight-forward and very short piece of draft legislation. There were several questions raised during the hearing, and ultimately, how the legislation was actually implemented would have bearing on the program success.

Water right buy-out programs

There are many different ways in which water conservation can be advanced without prohibiting continued ag production. Several past proposals (and likely future ones, as well) are water right buy-out programs. Generally, these programs use public funds to pay a landowner to return a water right to the state. Most all the proposals in the past several years have tried to leverage state monies by pulling down federal matching dollars. The largest pot of money was through the federal Conservation Reserve Program (CRP) and to participate in that program, land had to be idled.

Our association, along with the Kansas Grain & Feed Association and Kansas Agribusiness Retailers Association, opposed the idea of mandatory idling of land and the prohibition of all continued agricultural production. Land capable of supporting dry land crops should be allowed to continue in production. Prohibiting certain land uses had nothing to do with the conservation action of retiring the right.

Requiring land use changes, like moving from irrigation to idling, has economic impacts of varying degrees. Are those payments going to a local landowner or being sent out of the area to an absentee landowner? Are payments sufficient to compensate for loss of production revenue for the farmer/landowner? If the farm family has fewer dollars to spend, how is the community impacted? If the bank loaned money with irrigated land as collateral, and irrigated production ceases, does that mean they are under-collateralized on that loan? What is the loss in revenue in county property tax when irrigated land is reclassified? How is the local ag retailer impacted if there are fewer crops to protect and less grain to handle...and how does that decrease circulate through the local economy? Conserving water is an important public policy initiative and good resources management, but it will have costs that come in a variety of forms. Thus, we recommend an economic analysis, which evaluates the impacts on the local community, businesses and tax base be conducted as a pre-requisite to initiating a new water right buy-out program.

Another critical aspect of a buy-out program is ensuring that productive rights are purchased. If rights associated with poor-producing wells are purchased versus rights where wells are strong and running at/near full appropriation, then the conservation aspect is not maximized.

...blic dollars are being used to buy back rights, then the public should be assured the s...e is getting the most they could for that investment.

Other Considerations

Water is a critical natural resources and in a number of areas a scarce resource. A water right is a property right with real value to the holder. And, water can be treated somewhat as a commodity. Rights can be bought and sold and uses for water can be changed (subject to certain rules). Kansas already has a conservation presumption built into the change of use requirements when converting from ag to non-ag use. The ability for a right owner to sell or transfer property is an important aspect of our state water law and as with other property rights, one many holders consider dear.

Cooperative members across the state and their member owners value water, want to appropriately conserve this natural resource and are keenly aware of the important economic value access to water can generate. To date, many aspects of our current system of allocation work to balance a variety of interests. A key aspect of our allocation system is the division of authority between water quantity regulation and water quality regulation. Our members believe this separation of powers between water authorities is a critical element in preserving balance between competing water interests.

Water issues are of great importance, and ones in which the discussions can be quite extended. We are pleased to be part of this on-going dialogue and appreciate the opportunity to share concerns and comments with you. We look forward to continued efforts to address water issues in Kansas.

Thank you.

KANSAS FARM BUREAU
The Voice of Agriculture

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Kansas Farm Bureau Statement
Joint Committee on Energy and Environmental Policy

October 8, 2010
Submitted by:
Steve M. Swaffar
Director of Natural Resources

Chairperson McGinn and members of the committee, thank you for this opportunity to provide testimony concerning conservation as a new beneficial "non" use of water under the Kansas Water Appropriations Act. For those of you who were not present at the hearing on Senate Bill 510 I should say immediately that KFB was the only opponent of the bill that died last legislative session. It will come as no surprise to you that we still oppose the concept and in particular the application of the idea in areas of the State where water is still available for appropriation without being detrimental to the system.

As we contemplate the concept of conservation use as a beneficial use of water, we must distinguish between the notion of conservation viewed as a means to save water compared to conservation used to provide due and sufficient cause for non-use of a water right. The latter of these two seems to be the center of this discussion.

Application of nonuse beneficial use in areas open to appropriation is where the concept truly falls apart. It is fundamentally opposite to the intent of the Kansas Water Appropriation Act. Why should a water right be sheltered from abandonment if others can put it to economic benefit? How do you insert a non-use beneficial use into mature water law that was based upon the premise that applying water is fundamental to beneficial use, without disrupting the entire premise of the law?

Reference to the term "beneficial use" of water is made forty-nine times in the Kansas Water Appropriation Act. Twice the term, "principle of beneficial use" is referenced which infers there was a standard established for the terminology though undefined. I have attached an excerpt demonstrating how "beneficial use" is referenced in our water law just to give some hint to intent and importance of this terminology.

It seems the concept of conservation nonuse has gained some momentum in the "water stakeholder" public eye since the legislative session, but let me explain why we believe there is an underlying issue driving it. "Use it or lose it" is a phrase most of us are familiar with. This phrase refers to K.S.A. 82a-718, or the statutes governing the abandonment of water rights. This law may not be popular amongst some water right holders, particularly if it happens to be utilized on your right; however the protection it provides is one of the foundations of Kansas water law.

How is conservation beneficial use not in direct conflict with the intent of our current water law K.S.A. 82a-718 which states in relevant part that ***"...Every water right of every kind shall be deemed abandoned and shall terminate when without due and***

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***sufficient cause no lawful, beneficial use is henceforth made of water under such right for five successive years....*"** Again we must consider, does creating a non-use beneficial use circumvent the intent of this critical component of our water law?

It is still unclear what the goal of conservation beneficial use is. If it is to preserve water for future use, then perhaps the discussion should center on creating a program similar to the Water Rights Conservation Program. If it is to prevent abandonment proceedings in closed areas, then we should consider modifying K.S.A. 82a-718. In either case, conservation use is a convoluted solution to the issue with unknown consequences.

What are some of the consequences of adding conservation use as a beneficial use? I won't venture to guess what all of them might be, but besides being contrary to original intent of our law, adding non-use as a beneficial use will idle the application of water that creates economic benefit for our state. There will doubtless be others who believe the water right holder stands to benefit from holding the right by speculating that one day the right will be of greater value to their heirs. But this comes at a great expense to the present day economy of the state and to individuals who wish to seek present day economic gain from water use, while their neighbor or competitor holds an inactive water right indefinitely.

Since the hearing on SB 510 we have considered even more questions about the concept and the confusion or complications it may cause. Does the addition of conservation use create confusion in the priority system of water rights? For example, if a senior right is put into conservation use and new junior rights are put into the system; then subsequently the senior right is brought back into production, does this constitute a taking?

What happens to a water right that is put into conservation nonuse if an IGUCA is ordered while the right is shelved? Does that right come back into the system with full benefits if corrective controls have been ordered on other rights? Does the Chief Engineer have to expend resources to issue a supplemental order?

Who stands to benefit most from adding conservation use as a beneficial use of water? Individual water right holders who simply don't want to apply water for beneficial use but wish to hold on to the water right based upon speculation? More likely it is those who have abundant legal authority and resources to invest into future use of water by purchasing established water rights, converting them to "conservation use" while collecting and placing them on the shelf indefinitely awaiting return on their investment?

Clearly there are areas of the State that stand to benefit from water conservation, above the Ogallala aquifer is the obvious example. However, there are other areas of the State still open to new water right development hoping to generate economic gain for irrigation use, municipal drinking water, industrial use or one of the other eleven beneficial uses. These areas should not be denied the opportunity to make use of this water.

Thank you for this opportunity to provide our thoughts. I would be happy to answer questions at the appropriate time.

EXCERPT FROM THE KANSAS WATER APPROPRIATION ACT DEMONSTRATING CONNECTION BETWEEN BENEFICIAL USE AND APPLICATION OF WATER

K.S.A. 82a-701. Definitions

(d) "Vested right" means the right of a person under a common law or statutory claim to continue the use of water having actually been **applied** to any beneficial use... and shall include the right to take and **use water** for beneficial purposes where a person is engaged in the construction of works for the **actual application** of water to a beneficial use... person has not **applied** water to any beneficial use within the periods of time set out in this subsection.

(f) "Appropriation right" is a right...and to **apply** such water to a specific beneficial use or uses in preference to all appropriations right of later date.

K.S.A. 82a-705a. Domestic use after June 28, 1945; information to chief engineer. The **use of water** for domestic purposes instituted subsequently to June 28, 1945, to the extent that it is beneficial...

K.S.A. 82a-707. Principles governing appropriations; priorities. (a) Surface or ground waters of the state may be appropriated as herein provided. Such appropriation shall not constitute ownership of such water, and appropriation rights shall remain subject to **the principle of beneficial use**.

K.S.A. 82a-708a. Applications for permits to appropriate water; fee. (a) Any person may **apply for a permit to appropriate water to a beneficial use**, notwithstanding that the application pertains to the use of water by another, or upon or in connection with the lands of another. Any rights to the **beneficial use of water perfected** under such application...

K.S.A. 82a-709. Same; contents; time of filing....(f) the time of the first **actual application of the water** to the beneficial use involved, if there was such, and the estimated time for the first **actual application** of the water for the beneficial use proposed;...

K.S.A. 82a-711. Permits to appropriate water; standards for approval of use; review of action on application....**utilization of water** for beneficial purpose...

K.S.A. 82a-712. Same; notice of approval or disapproval of application; approval constitutes permit.... proceed with all steps necessary for the **application of the water** to the approved and proposed beneficial use...

(Emphasis denoted by bold text)

K.S.A. 82a-714. Same; completion of works; extension of time; certificate of appropriation; fees. (a) Upon the completion of the construction of the works and the **actual application of water** to the proposed beneficial use...
(b) ...**actually apply water** to the proposed beneficial use...

(c) (3) ...the **actual application** of water to the proposed beneficial use...

K.S.A. 82a-718. Abandonment of water rights; notices; hearing; review of action; exceptions. (a) All appropriations of water must be for some beneficial purpose. Every water right of every kind shall be deemed abandoned and shall terminate when without due and sufficient cause no lawful, **beneficial use is henceforth made of water** under such right for five successive years...

(c) The provisions of subsection (a) shall not apply to a water right that has not been declared abandoned and terminated before the effective date of this act if the five years of successive **nonuse** occurred exclusively and entirely before January 1, 1990. However, the provisions of subsection (a) shall apply if the period of five successive years of **nonuse** began before January 1, 1990, and continued after that date.

K.S.A. 82a-727. Temporary permits to appropriate water; extension; fee; rules and regulations. (a) Subject to existing water rights and the **principle of beneficial use**...

K.S.A. 82a-728. Unlawful acts; penalties....the annual **diversion and beneficial use...**

K.S.A. 82a-734. Sand and gravel pits; beneficial use of water, when; permit; perfection of appropriation; reports to chief engineer...(b) The net evaporation of water exposed as the result of the opening or operation of sand and gravel pits shall be construed to be a **beneficial use or diversion of water** for the purposes of the Kansas water appropriation act...

K.S.A. 82a-736. Multi-year flex accounts....(B) amount of water **actually used** for a beneficial use...

K.S.A. 42-313. Right to collect and store water. Any person entitled to **use water** for beneficial purposes...

(Emphasis denoted by bold text)

KANSAS
DEPARTMENT OF AGRICULTURE

Mark Parkinson, Governor
Joshua Svaty, Secretary

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Presentation on Groundwater Management District Permits
to
The Interim Committee

by Lane P. Letourneau, L.G
Water Appropriation Program Manager
Kansas Department of Agriculture

October 8, 2010

Chairman McGinn and members of the committee, I am Lane Letourneau, program manager for the Water Appropriation program within the Department of Agriculture's Division of Water Resources.

We administer the Kansas Water Appropriation Act, which dedicates the use of our state's water for the benefit of all Kansans. It is our guide to water allocation and it allows us to regulate water use in the state. The act gives the chief engineer authority to approve an appropriation right to start using water for a beneficial purpose. Once the right is developed, it becomes a private property right.

Kansas also has the Groundwater Management District Act, which allows groundwater management districts to form. Currently there are five districts strategically located over our principal groundwater sources. Each district is managed locally and each has its own board of directors. They provide input for rules and regulations adopted by the chief engineer.

I was asked here today to talk about water right permitting within groundwater management districts. I speak on behalf of the Division of Water Resources and groundwater management districts, since we use similar techniques with subtle differences in methodology.

The people we regulate can be confused by the different layers of government. Permits to appropriate water are not issued by groundwater management districts. They are issued by the chief engineer. If the proposed appropriation is located within the boundaries of a groundwater management district, the chief engineer works closely with the district to ensure the local concerns are addressed, as long as they are within the law. We use the groundwater management district standards listed in their rules. Groundwater management district staff review permit applications and provide recommendations to the chief engineer. An applicant has an opportunity to appeal an adverse recommendation to the groundwater management district board before the chief engineer makes his final decision.

A statute in the Water Appropriation Act, KSA 82a-711, states in part that the chief engineer must take into consideration the area, safe yield and recharge rate of the appropriate

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water supply, and established minimum desirable streamflow requirements. The act also states that a proposed use cannot impair an existing use.

As geologists and engineers, safe yield is the tool we use to allocate the resource to protect existing water rights and a viable, long-term water supply. Safe yield is not complicated, but it is specific to a site because it is based on the geology, area of the aquifer and local rainfall. Our rules, which are listed below, are guidelines to implement what is set forth in KSA 82a-711.

I have attached straightforward examples that show how we use safe yield and how it protects streamflow and existing water rights.

I will stand for questions.

Chief Engineer's Statutory Authority

K.S.A. 82a-711

Permits to appropriate water; standards for approval of use; review of action on application.

(a) If a proposed use neither impairs a use under an existing water right nor prejudicially and unreasonably affects the public interest, the chief engineer shall approve all applications for such use made in good faith in proper form which contemplate the utilization of water for beneficial purpose, within reasonable limitations except that the chief engineer shall not approve any application submitted for the proposed use of fresh water in any case where other waters are available for such proposed use and the use thereof is technologically and economically feasible. Otherwise, the chief engineer shall make an order rejecting such application or requiring its modification to conform to the public interest to the end that the highest public benefit and maximum economical development may result from the use of such water.

(b) In ascertaining whether a proposed use will prejudicially and unreasonably affect the public interest, the chief engineer shall take into consideration:

(1) Established minimum desirable streamflow requirements;

(2) the area, safe yield and recharge rate of the appropriate water supply;

(3) the priority of existing claims of all persons to use the water of the appropriate water supply;

(4) the amount of each claim to use water from the appropriate water supply; and

(5) all other matters pertaining to such question.

(c) With regard to whether a proposed use will impair a use under an existing water right, impairment shall include the unreasonable raising or lowering of the static water level or the unreasonable increase or decrease of the streamflow or the unreasonable deterioration of the water quality at the water user's point of diversion beyond a reasonable economic limit. Any person aggrieved by any order or decision by the chief engineer relating to that person's application for a permit to appropriate water may petition for review thereof in accordance with the provisions of K.S.A. 2005 Supp. 82a-1901 and amendments thereto.

(History: L. 1945, ch. 13 390, § 11; L. 1957, ch. 539, § 16; L. 1977, ch. 356, § 6; L. 1980, ch. 332, § 3; L. 1986, ch. 392, § 3; L. 1991, ch. 292, § 3; L. 1999, ch. 130, § 5; July 1.)

Regulatory Authority

DWR
K.A.R. 5-3-10 through K.A.R. 5-3-29
Recharge based on USGS Report 87-4230

GMD No. 1
K.A.R. 5-21-4 Safe Yield. We are working on a rule change to close the Ogallala and Dakota to further appropriation.

GMD No. 2
K.A.R. 5-22-7 Safe Yield GMD No. 2
Recharge is 6" in entire district except McPherson County, which is 3".

GMD No. 3
K.A.R. 5-23-4 Safe Yield: High Plains Aquifer
K.A.R. 5-23-4a Criteria for Closing Townships to New Appropriation
K.A.R. 5-23-4b Township Closures

GMD No. 4
K.A.R. 5-24-2 Allowable Withdrawals

GMD No. 5
K.A.R. 5-25-4 Sustainable Yield "...(c), the district has been determined to be appropriated to the sustainable yield level, and therefore the entire district shall be closed to further new surface water and groundwater appropriations filed on or after December 17, 1998."

K.A.R. 5-3-9. Public interest. (a) In accordance with K.S.A. 82a-711(b)(5), as amended, in ascertaining whether a proposed use will prejudicially and unreasonably affect the public interest, the chief engineer shall also take into consideration the quantity, rate and availability of water necessary to:

(1) satisfy senior domestic water rights from the stream;

(2) protect senior water rights from being impaired by the unreasonable concentration of naturally occurring contaminants; and

(3) over the long term reasonably recharge the alluvium or other aquifers hydraulically connected to the stream.

(b) Unless otherwise provided by regulation, it shall be considered to be in the public interest that only the safe yield of any source of water supply, including hydraulically connected sources of water supply, shall be appropriated. (Authorized by K.S.A. 82a-706a; implementing K.S.A. 1993 Supp. 82a-711; effective Nov. 28, 1994.)

K.A.R. 5-3-10. Availability of water for appropriation - safe yield. (a) Except as set forth in subsection (b) and K.A.R. 5-3-16 and K.A.R. 5-3-17, the approval of any new application to appropriate groundwater or surface water for beneficial use, except for domestic use, temporary use and term permits for five years or less, shall not cause the safe yield of the source of water supply to be exceeded, neither shall it otherwise prejudicially and unreasonably affect the public interest. The approval of term permits shall not allow impairment nor prejudicially and unreasonably affect the public interest.

(b) This regulation shall not apply to an application which proposes:

(1) to divert water from a source of water supply subject to a different safe yield, allowable appropriation, depletion or other similar type of criteria adopted by rule and regulation of the chief engineer or intensive groundwater use control area order of the chief engineer issued pursuant to K.S.A. 82a-1036 et seq., or

(2) to use water in a manner so that there is no significant net consumptive use of the local source of supply either in quantity or availability of water for use by other appropriators.

(c) If a total quantity of water that is available for appropriation in any basin, subbasin, stream reach or other hydrologic unit has been determined by the chief engineer prior to the date that application is filed, the total quantity of water authorized by vested rights, prior appropriations, requests by prior unapproved applications and the proposed appropriation shall be determined by the chief engineer.

(1) If the total quantity of water authorized and requested by applications with earlier filing dates is less than or equal to the total annual quantity of water determined to be available for appropriation, or if no total quantity of water available was determined by the chief engineer prior to the date the application was filed, the following procedures shall be used by the chief engineer to further evaluate the applications:

(A) K.A.R. 5-3-11 shall be used to evaluate an application to appropriate groundwater from an unconfined aquifer;

(B) K.A.R. 5-3-14 shall be used to evaluate an application to appropriate groundwater from a confined aquifer; or

(C) K.A.R. 5-3-15 shall be used to evaluate an application to appropriate surface water.

(2) If the total quantity of water authorized and requested exceeds the limit determined by the chief engineer pursuant to this subsection, the application shall be denied or considered only for the quantity available. (Authorized by K.S.A. 82a-706a; implementing K.S.A. 1993 Supp. 82a-711; effective Nov. 28, 1994.)

K.A.R. 5-3-11. Availability of water for appropriation-safe yield; unconfined groundwater aquifers. (a) Each application to appropriate groundwater from an unconfined aquifer shall be processed in accordance with this regulation.

(b) To determine the safe yield available for appropriation from an unconfined aquifer at a specific location, the following procedure shall be used by the chief engineer:

(1) The amount of calculated recharge occurring within the area of consideration shall be determined by the chief engineer.

(2) That amount shall be multiplied by the percent of calculated recharge determined by the chief engineer to be available nondomestic groundwater and surface water for appropriation.

(3) The total quantity of water authorized and requested in the same area of consideration shall be subtracted from the number derived from paragraph (b)(2) above. If a water right or permit authorizes more than one point of diversion and not all of them are within the area of consideration, the authorized quantity shall be divided equally between or among all

the points of diversion, unless information is available to more accurately distribute the authorized quantity between or among the multiple points of diversion.

(c)(1) If the quantity of water remaining is sufficient to satisfy the proposed application, then the safe yield criteria shall be deemed to have been met, unless there are other relevant factors that need to be taken into account in order to protect the public interest. The application shall then be processed according to other criteria in effect in that area.

(2) If there is sufficient water available to reasonably satisfy part of the request, then the application shall be approved for the quantity available if the remaining quantity is reasonable for the proposed use and the application meets the other applicable criteria in that area.

(3) If no water is available to satisfy the proposed application, then the application shall be denied by the chief engineer.

(d)(1) In making a safe yield calculation, unless the context clearly requires otherwise, the following words and phrases shall have the meanings ascribed to them:

(A) "Circle" means a circle with a two-mile radius, with the proposed point of diversion as the center.

(B) "Area of consideration" means the portion of the two-mile circle located within the limits of the unconfined aquifer expressed in acres, including any area of the circle located within the boundaries of a groundwater management district. The area of consideration shall not include any portion of the circle located outside the state of Kansas.

(C) "Total quantity of water" means the total combined authorized annual quantities under all groundwater rights and approvals of applications, and requested by pending applications with a senior priority in that unconfined aquifer except for domestic use, temporary permits, and term permits for five or fewer years with priority dates senior to the proposed application and with points of diversion located within the area of consideration.

(D) "Calculated recharge" means that portion of the average annual precipitation that becomes recharge to the unconfined aquifer, calculated using the data shown on water resources investigations report 87-4230, plate no. 4, dated 1987, prepared by the United States geological survey, hereby adopted by reference, interpolated to the nearest tenth of an inch, unless better or more specific recharge data for the area of consideration, basin, or aquifer is supplied by the applicant or is already available to the chief engineer. **(See insert, pg 48.)**

(2) The calculated recharge in the Kansas river alluvium shall be determined by taking 25% of the average annual rainfall in the area of consideration as taken from figure 2, United States geological survey water resources investigation report 92-4137, dated 1993, hereby adopted by reference, interpolated to the nearest 0.1 of an inch. **(See insert, pg 49.)**

(3) For each application to appropriate groundwater from an unconfined aquifer filed on or after the effective date of this regulation, the percentages of calculated recharge that shall be considered to be available for appropriation shall be determined using the following table:

	Percent of CalculateRecharge Available for Appropriation	**River Basin**
(A)	100% plus the recharge from the Missouri River available to the well,	Missouri

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	Percent of CalculateRecharge Available for Appropriation as calculated by a Jenkins or similar stream-depletion technique.	River Basin
(B)	100%	Arkansas River below Hutchinson* Big Blue River ** Black Vermillion River ** Delaware River ** Little Arkansas River below GMD No. 2 * Little Blue River ** Little Osage River ** Lower Republican River Basin outside the effective alluvium and the Belleville formation that does not contribute significant baseflow to a stream** Marais des Cygnes River ** Mill Creek ** Marmaton River ** Nemaha River ** Pottawatomie Creek ** Smoky Hill River below its confluence with the Saline River** Spring River* Stranger Creek** Sugar Creek** Vermillion Creek** Wakarusa River** Walnut River* Any hydrologic unit that does not contribute significant baseflow to a stream.
(C)	75%	Any hydrologic units in the following river basins that contribute significant baseflow to a stream: Arkansas River above Hutchinson* Caney River* Cottonwood River* Cow Creek outside the boundaries of GMD No. 2 and GMD No. 5* Elk River* Fall River* Kansas River** Little Arkansas River above GMD No. 2 LowerRepublican River Basin outside the effective alluvium and the Belleville formation that contributes significant baseflow to a stream.** Neosho River* Ninnescah River* Saline River** Salt Creek** Smoky Hill above its confluence with the Saline River** Solomon River** South Fork Ninnescah River (except Smoots Creek)* Upper Republican Basin outside areas closed to new appropriations as set forth in paragraph (d)(5) of this regulation.** Verdigris River*

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Percent of CalculateRecharge Available for Appropriation	River Basin
(D) 50%	Any other basin in Kansas not specifically identified Any hydrologic units in the following river basins that contribute significant baseflow to a stream: Bluff Creek-Chikaskia River* Bluff Creek-Cimarron River* Chikaskia River* Cimarron River outside GMD No. 3* Medicine Lodge River* North Fork Ninnescah River* Rattlesnake Creek* Salt Fork Arkansas River* Sandy Creek* South Fork Ninnescah River (Smoots Creek only)*

*** Located in Arkansas River Basin**
**** Located in Kansas River Basin**

(4) The total quantity of water and the percent of calculated recharge originally available to be appropriated for nondomestic groundwater and surface water use in all or part of the following basins, subbasins, stream reaches, and other hydrologic units identified in electronic data file unitbsn.e00, dated July 30, 1997, prepared by the division of water resources, Kansas department of agriculture and hereby adopted by reference for the purpose of defining the boundaries of the hydrologic units, shall be determined using the following table:

South-Central Kansas Designated Unit Areas

Map Label	Effective Date	Area (acres)	Recharge Rate (in/yr)	Recharge Quantity (Ac-ft/yr)	Percentage of Recharge to Appropriate	Original Quantities Available (Ac-ft/yr)	General Location (Twp.-Range)	Abbreviation for Portion of Basin or Basins
1	November 28, 1994	32204	1.8	4831	100%	4831	29-12w	Chikaskia
2	November 28, 1994	41426	1.8	6214	100%	6214	30-11w	Chikaskia
3	November 28, 1994	55524	1.8	8329	50%	4164	29-10w	Chikaskia
4	November 28, 1994	43603	1.8	6540	50%	3270	30-10w	Chikaskia
5	November 28, 1994	46828	2.0	7805	50%	3902	31-05w	Chikaskia
6	November 28, 1994	46895	2.5	9770	50%	4885	33-03w	Chikaskia
7	November 28, 1994	37378	3.0	9344	50%	4672	34-02w	Chikaskia
8	November 28, 1994	42210	3.0	10553	50%	5276	33-01w	Chikaskia
9	November 28, 1994	15145	2.0	2524	100%	2524	30-08w	Chikaskia
10	November 28, 1994	6855	2.0	1143	100%	1143	31-06w	Chikaskia
11	November 28, 1994	2824	2.0	471	100%	471	31-06w	Chikaskia
12	November 28, 1994	8548	2.0	1425	100%	1425	31-05w	Chikaskia
13	November 28, 1994	12165	2.0	2027	50%	1014	31-07w	Chikaskia
14	November 28, 1994	27213	2.0	4535	50%	2268	32-05w	Chikaskia
15	November 28, 1994	21101	1.5	2638	50%	1319	31-15w	Medicine Lodge
16	November 28, 1994	7489	1.5	936	50%	468	32-11w	Medicine Lodge
17	November 28, 1994	20516	1.5	2564	50%	1282	33-11w	Medicine Lodge
18	November 28, 1994	34426	1.5	4303	50%	2152	29-19w	Rattlesnake

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South-Central Kansas Designated Unit Areas

Map Label	Effective Date	Area (acres)	Recharge Rate (in/yr)	Recharge Quantity (Ac-ft/yr)	Percentage of Recharge to Appropriate	Original Quantities Available (Ac-ft/yr)	General Location (Twp.-Range)	Abbreviation for Portion of Basin or Basins
19	November 28, 1994	25566	1.5	3196	50%	1598	29-18w	Medicine Lodge
20	November 28, 1994	56730	1.8	8509	100%	8509	29-14w	Medicine Lodge
21	November 28, 1994	41800	1.8	6270	50%	3135	30-12w	Medicine Lodge
22	November 28, 1994	15825	1.2	1582	50%	791	30-17w	Medicine Lodge
23	November 28, 1994	59864	1.5	7483	50%	3742	29-16w	Medicine Lodge
24	November 28, 1994	37658	1.5	4707	100%	4707	29-15w	Medicine Lodge
25	November 28, 1994	102144	1.9	16173	75%	12130	28-09w	SF Ninnescah
26	November 28, 1994	10638	2.0	1773	75%	1330	28-07w	SF Ninnescah
27*	Revision	84047	2.0	14008	50%	7004	26-07w	SF Ninnescah
28	November 28, 1994	5196	2.2	953	75%	714	28-04w	SF Ninnescah
29	November 28, 1994	73816	1.9	11688	100%	11688	28-07w	Chik/SFNin/Nin
30	November 28, 1994	38651	2.0	6442	100%	6442	30-05w	Chik/SFNin/Nin/Ark
31	November 28, 1994	5572	2.3	1068	100%	1068	31-04w	Chik/Ark
32	November 28, 1994	21937	2.0	3656	100%	3656	27-07w	SF Ninnescah
33	November 28, 1994	40646	2.5	8468	75%	6351	23-08w	Arkansas
34	November 28, 1994	41974	2.3	8045	75%	6034	24-08w	NF Ninnescah
35	November 28, 1994	3917	2.0	653	75%	490	26-08w	NF Ninnescah
36	November 28, 1994	12106	2.0	2018	75%	1513	27-10w	NF Ninnescah
37	November 28, 1994	8135	2.0	1356	75%	1017	26-08w	NF Ninnescah
38*	Revision	34550	1.2	3455	50%	1728	32-20w	Bluff Creek (Cim)
39	November 28, 1994	21875	1.2	2188	50%	1094	33-20w	Bluff Creek (Cim)
40	November 28, 1994	11466	1.2	1147	50%	573	33-20w	Bluff Creek (Cim)
41	November 28, 1994	8565	1.6	1142	50%	571	34-17w	Salt Fork Arkansas
42	November 28, 1994	3746	1.6	499	50%	250	33-15w	Salt Fork Arkansas
43	November 28, 1994	9763	1.6	1302	50%	651	34-15w	Salt Fork Arkansas
44	November 28, 1994	33060	1.8	4959	100%	4959	31-10w	Sandy Cr
45	November 28, 1994	3922	1.8	588	100%	588	33-09w	Sandy Cr
46	November 28, 1994	26959	1.8	4044	50%	2022	32-10w	Sandy Cr
47	November 28, 1994	41296	1.8	6194	50%	3097	34-09w	Sandy Cr
48	November 28, 1994	36364	1.9	5758	50%	2879	31-08w	Bluff Creek (Chik)
49	November 28, 1994	45511	2.0	7585	50%	3793	32-07w	Bluff Creek (Chik)
50	November 28, 1994	23546	2.3	4513	50%	2257	34-06w	Bluff Creek (Chik)
51	November 28, 1994	25608	2.7	5762	50%	2881	35-03w	Bluff Creek (Chik)
52	November 28, 1994	4460	1.9	706	100%	706	32-09w	Sandy Cr
53	November 28, 1994	17083	2.0	2847	100%	2847	33-08w	Sandy Cr/Bluf (Chik)
54	November 28, 1994	3845	2.0	641	50%	320	32-08w	Sandy Cr/Bluf (Chik)
55	July 5, 1996	3582	1.2	358	50%	179	35-18w	Cimarron
56	July 5, 1996	10967	1.2	1097	50%	548	35-19w	Cimarron
57	July 5, 1996	37387	1.2	3739	50%	1869	34-20w	Cimarron
58	July 5, 1996	3379	1.3	366	50%	183	33-21w	Cimarron

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South-Central Kansas Designated Unit Areas

Map Label	Effective Date	Area (acres)	Recharge Rate (in/yr)	Recharge Quantity (Ac-ft/yr)	Percentage of Recharge to Appropriate	Original Quantities Available (Ac-ft/yr)	General Location (Twp.-Range)	Abbreviation for Portion of Basin or Basins
59	July 5, 1996	5885	1.3	638	50%	319	35-22w	Cimarron
60	July 5, 1996	14854	1.3	1609	50%	805	33-22w	Cimarron
61	July 5, 1996	34080	1.3	3692	50%	1846	34-22w	Cimarron
62	July 5, 1996	25419	1.3	2754	50%	1377	31-17w	Salt Fork
63	July 5, 1996	29813	1.3	3230	15%	484	32-17w	Salt Fork
64	July 5, 1996	90035	1.3	9754	50%	4877	31-18w	Salt Fork
65	July 5, 1996	35931	1.3	3893	50%	1946	31-19w	Bluff Creek
66	July 5, 1996	100983	1.3	10940	50%	5470	30-20w	Bluff-Rattlesnake
67	July 5, 1996	111132	1.2	1113	50%	5557	30-24w	Bluff-Crooked
68	July 5, 1996	12188	1.2	1219	50%	609	31-23w	Cimarron
69	July 5, 1996	5518	1.2	552	50%	276	31-24w	Cimarron
70	July 5, 1996	32689	1.2	3269	50%	1634	32-25w	Cimarron
71	July 5, 1996	94734	1.3	10263	50%	5131	32-26w	Cim-Crooked
72	July 5, 1996	44833	1.3	4857	50%	2428	33-27w	Cim-Crooked
73	July 5, 1996	50088	1.3	5426	50%	2713	34-27w	Cim-Crooked
74	July 5, 1996	25210	1.3	2731	50%	1366	35-27w	Cim-Crooked
75	July 5, 1996	103816	1.3	11247	50%	5623	34-24w	Cim-Crooked
76	July 5, 1996	23296	1.2	2330	50%	1165	30-22w	Bluff-Rattlesnake
77	July 5, 1996	27666	1.2	2767	50%	1383	32-15w	Salt-Medicine
78	July 5, 1996	5261	1.2	526	100%	526	35-13w	Salt Fork
79	July 5, 1996	8249	1.8	1237	50%	619	31-12w	Medicine

* Revision is effective the date of this regulation.

(See insert, pg 50.)

(5) The following hydrologic units, which have been determined by the chief engineer to be fully appropriated based on the safe yield criteria, shall be closed to further new surface water and groundwater appropriations except for domestic use, temporary permits, and term permits for five years or less:

(A) Big Creek, its tributaries and their valley alluviums, and any other aquifer that has a substantial hydraulic connection to an alluvium;

(B) Beaver Creek and Little Beaver Creek, their tributaries and their alluviums, and any other aquifer that has a substantial hydraulic connection to an alluvium;

(C) North Fork Solomon River, its tributaries and their alluviums, and any other aquifer that has a substantial hydraulic connection to an alluvium;

(D) Prairie Dog Creek, its tributaries and their alluviums, and any other aquifer that has a substantial hydraulic connection to an alluvium;

(E) Sappa Creek, its tributaries and their alluviums, and any other aquifer that has a substantial hydraulic connection to an alluvium;

(F) South Fork of the Solomon River, its tributaries and their alluviums above Glen Elder Dam, and any other aquifer that has a substantial hydraulic connection to an alluvium; and

(G) Walnut Creek, its tributaries and their alluviums, and other hydraulically connected aquifers outside the boundaries of the intensive groundwater use control area created by order of the chief engineer shall be those set forth below:

Section	Township	Range	County
28 through 33	18S	13W	Barton
4 through 10 and 14 through 36	18S	14W	Barton
1 through 36	18S	15W	Barton
3 through 11 and 14 through 23	19S	13W	Barton
1 through 6, 9 through 15, and 22 through 24	19S	14W	Barton
1	19S	15W	Barton
31 through 35	17S	16W	Rush
19 through 36	17S	17W	Rush
19 through 36	17S	18W	Rush
23 through 26 and 31 through 36	17S	19W	Rush
35 and 36	17S	20W	Rush
1 through 36	18S	16W	Rush
1 through 36	18S	17W	Rush
1 through 36	18S	18W	Rush
1 through 36	18S	19W	Rush
1 through 36	18S	20W	Rush
3 through 6	19S	16W	Rush
1 through 6	19S	17W	Rush
1, 2, 11, and 12	19S	20W	Rush
32 through 34	17S	25W	Ness
1 through 36	18S	21W	Ness
1 through 4 and 7 through 36	18S	22W	Ness
19, 25 through 36	18S	23W	Ness
13 through 27, 35, and 36	18S	24W	Ness
1 through 5, 10 through 13, 24, 33 and 34	18S	25W	Ness
4 through 9	19S	21W	Ness
1 through 12, 17 and 18	19S	22W	Ness
1 through 23	19S	23W	Ness
1, 2, and 7 through 29	19S	24W	Ness
1 through 3 and 11 through 13	19S	25W	Ness

(6) "Technical guidelines for determining the availability of groundwater for appropriation in the Lower Republican River Basin and Belleville Formation and the availability of surface water for appropriation in the Lower Republican River Basin," adopted by the chief engineer, division of water resources, Kansas department of agriculture, on October 1, 1999, is hereby adopted by reference as determining the availability of groundwater for appropriation in the lower Republican River basin and Belleville formation and the availability of surface water for appropriation in the lower Republican River basin. **(See inserts, pgs 51-58).**

(7)(A) All applications for a permit to appropriate groundwater from the area described in paragraph (7)(B) for any beneficial use, except for domestic use, temporary permits, and short-term permits for five or fewer years, shall be accepted for filing and given a file number, if acceptable for filing. The application shall be returned by the chief engineer, and the reason that the application will be denied shall be specified by the chief engineer. The applicant shall be given 30 days to show cause why the application should not be denied. If the applicant does not show good cause, the application shall be dismissed.

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(B) The area is described as sections 17, 18, 19, 20, township 7 south, range 6 west, and sections 13, 14, township 7 south, range 7 west, all in Mitchell County, Kansas.

(C) All applications for permits to appropriate groundwater from sections 29 and 30 in township 7 south, range 6 west, and sections 12, 15, 16, 21, 22, 23, 24, 25, 26, and 27 in township 7 south, range 7 west, all in Mitchell County, Kansas, for any beneficial use, except for domestic use, temporary permits, and term permits for five or fewer years, shall be processed based on the criteria set forth below in paragraph (7) (D).

(D) No new wells shall be allowed in the area described in paragraph (7) (C) above if the proposed well would produce one foot or more of additional drawdown at any existing well in that area and if the proposed well was pumped continuously for 45 days (1,080 hours) at the rate requested on the application. This analysis shall be done by using the Theis equation, with a coefficient of transmissivity of 71,000 gallons per day per foot (gpd/ft) and a coefficient of storage of 0.02.

(E) Any application for a change in the point of diversion filed for a well located in the areas described in paragraphs (7) (B) and (C) above shall be limited to a move of no more than 100 feet, unless the applicant can show the chief engineer that the proposed move will not prejudicially and unreasonably affect the public interest, will not impair existing water rights, and otherwise complies with the provisions of K.S.A. 82a-708b, and amendments thereto. (Authorized by K.S.A. 82a-706a; implementing K.S.A. 1999 Supp. 82a-711; effective Nov. 28, 1994; amended Sept. 22, 2000.)

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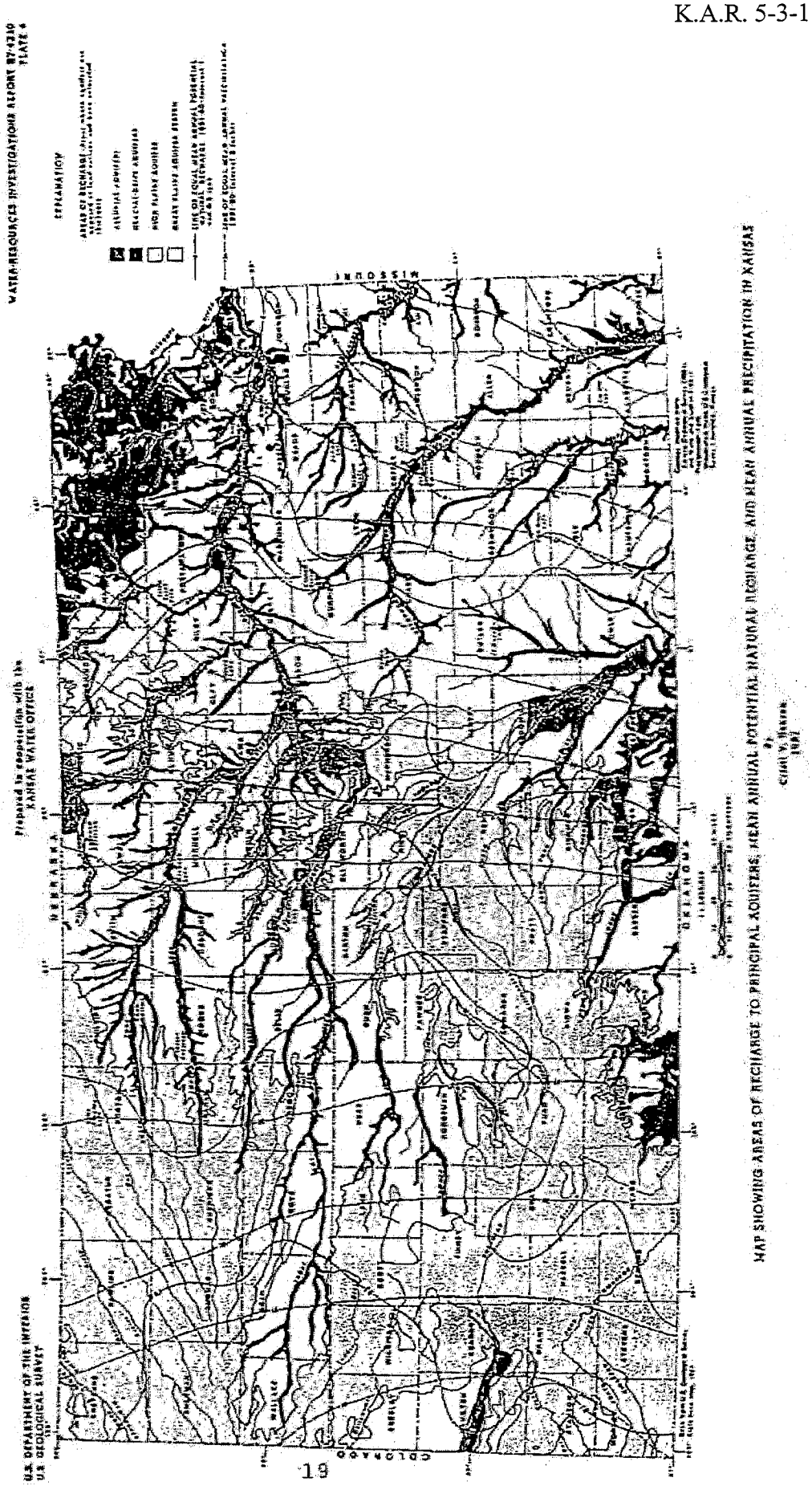

WATER-RESOURCES INVESTIGATIONS REPORT 87-4230
PLATE 4
EXPLANATION
Prepared in cooperation with the
KANSAS WATER OFFICE
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
MISSOURI
NEBRASKA
OKLAHOMA
COLORADO
MAP SHOWING AREAS OF RECHARGE TO PRINCIPAL AQUIFERS, MEAN ANNUAL POTENTIAL NATURAL RECHARGE, AND MEAN ANNUAL PRECIPITATION IN KANSAS
1981

29-13

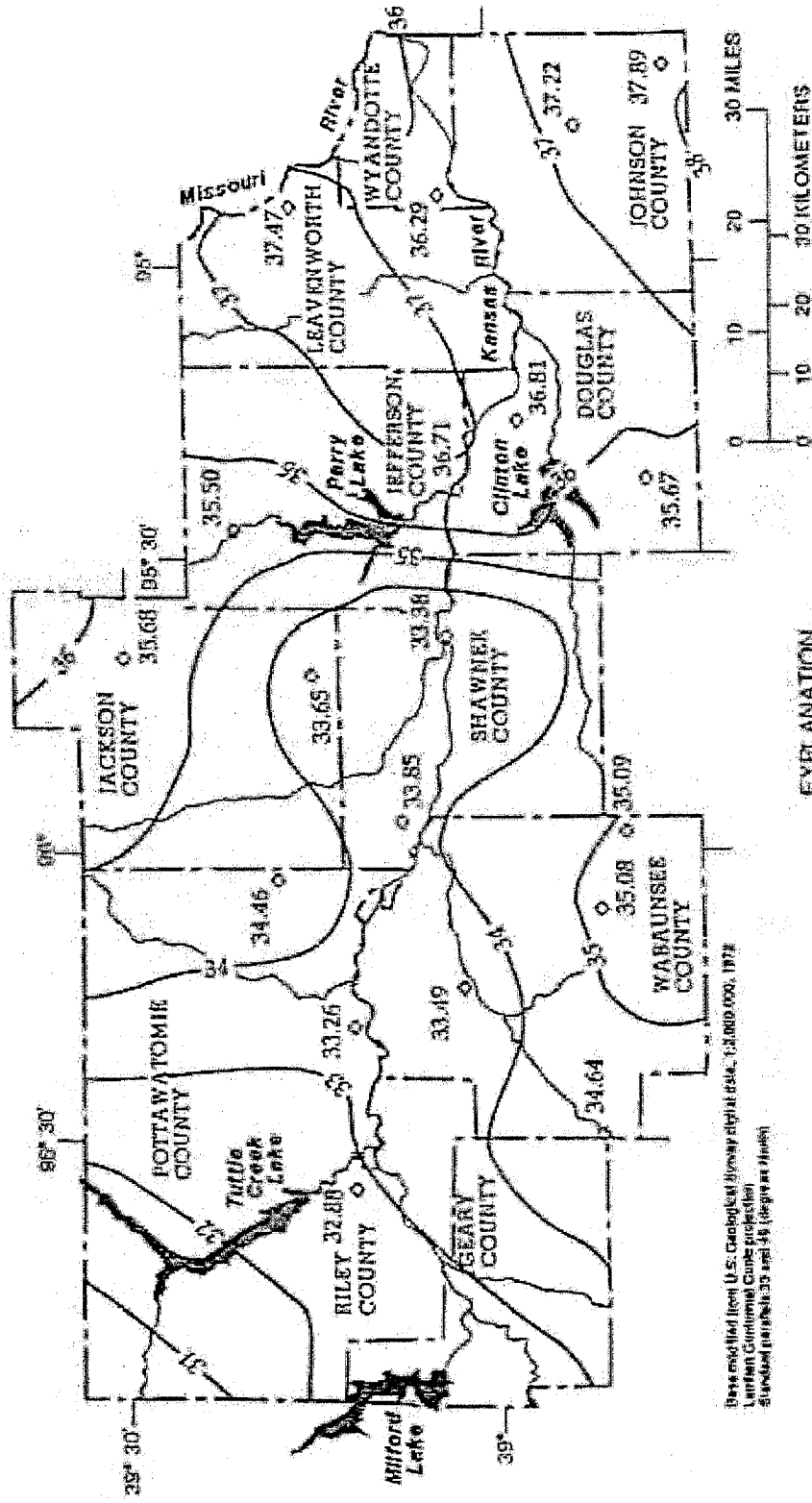


Figure 2. Mean annual precipitation in Kansas River valley, 1951-80 (data from National Oceanic and Atmospheric Administration, 1951-80).

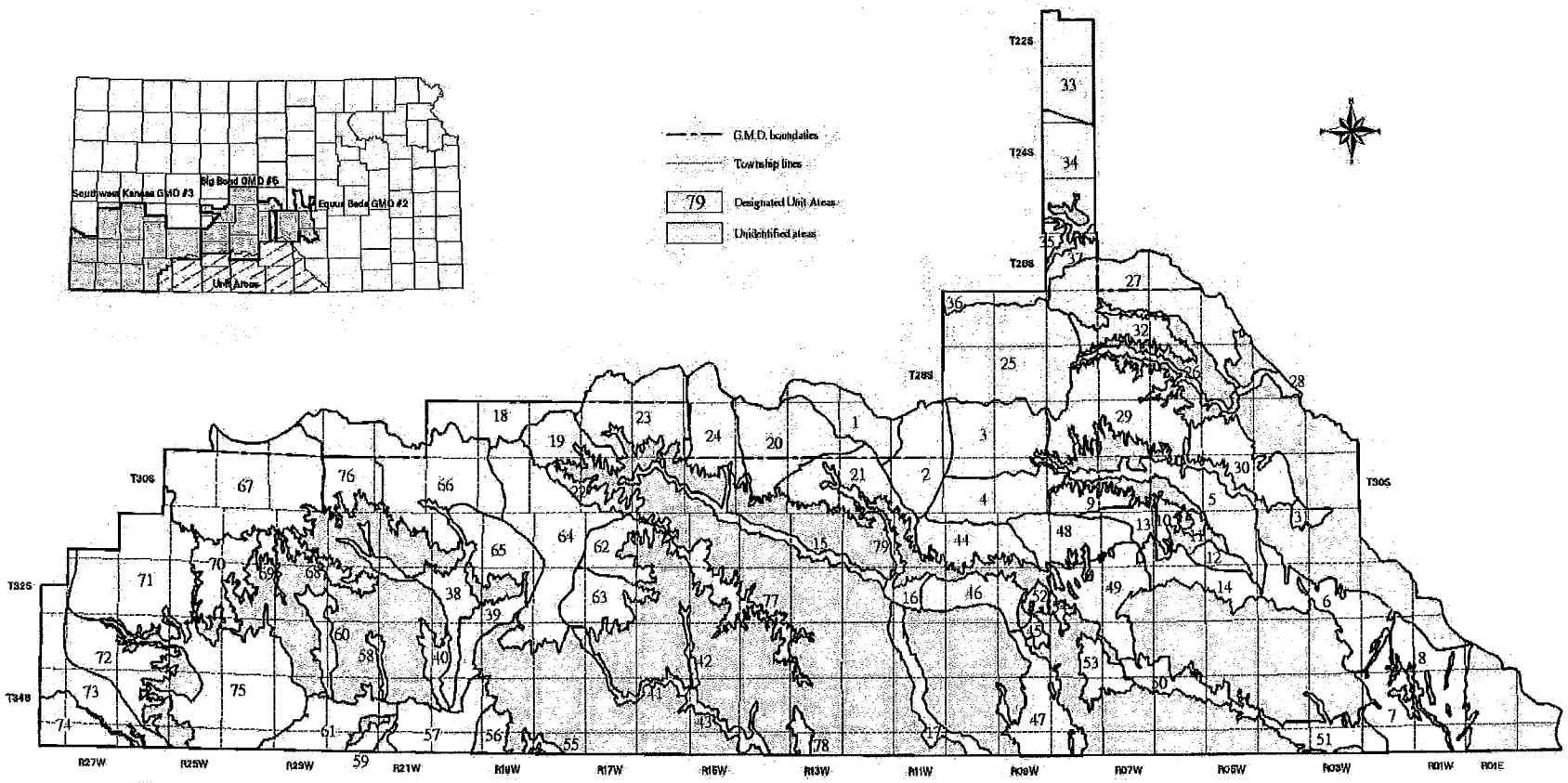
U.S. Geological Survey Water-Resources Investigations Report 92-4137

1993

Division of Water Resources Hydrologic Atlas 96-1
July 5, 1996

SouthCentral Kansas Designated Unit Areas

for appropriations of water outside of Groundwater Management Districts



Units 1 –26, 28 –37, and 39 –54 effective November 28, 1994
Units 27 and 38 effective the date of this regulation
Units 55 –79 effective July 5, 1996

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Kansas Department of Agriculture
Division of Water Resources
Technical Services Section

September 1997

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Kansas Department of Agriculture
Division of Water Resources

Technical Guidelines for determining the availability of groundwater for appropriation in the Lower Republican River Basin and Belleville Formation and the availability of surface water for appropriation in the Lower Republican River Basin

Adopted by: David L. Pope, P.E., Chief Engineer
Date: October 1, 1999

All applications for a permit to appropriate groundwater and surface water from the Lower Republican River Basin for any beneficial use, except for domestic use, temporary permits and short term permits for five years or less, shall be processed based on the following criteria:

I. Definitions

A. "The Lower Republican River Basin" (hereinafter referred to as the "Basin") encompasses the entire drainage area of the Republican River and its tributaries from the Nebraska state line down to where the Republican River intersects the center line of Milford Dam, as shown on the attached map (Attachment A). The Basin includes the entire Belleville Formation, including that portion extending into the Little Blue River Basin. The Basin does not include the unconfined Dakota formation, the Meade formation, and any other areas located outside the effective alluvium located in this basin.

B. The "Belleville Formation" is considered to be located in Sections 5, 6, 7, 8, 17 and 18, Range 2 West, all of Range 3 West and Range 4 West, excluding Sections 30, 31 and 32 in Range 4 West; and including Sections 1, 12, 13 and the northeast diagonal half of Section 24 in Range 5 West, all in Township 1 South.

C. The "effective alluvial aquifer" is considered to extend up to one and one-half miles each side of the centerline of the Republican River unless the land surface has a slope of 2% or greater as determined from the latest U.S.G.S. seven and one half minute topographic map, in which case the boundary is 500 feet farther away from the river from the point where the land begins to slope at a grade in excess of 2% (not to exceed one and one-half miles from the centerline of the Republican River). This boundary shall be used unless better information is available to make a more precise determination in an individual case. If better or more site specific information is available, it may be used.

D. The "effective recharge area" for a well is the circular area around the well where a specified draw-down occurs on the perimeter of the circle if the total proposed appropriation of water is assumed to be pumped continuously throughout a specified period, based on a Theis Non-Equilibrium Equation Analysis, as described in Groundwater and Wells, 1966, Edward E. Johnson, Saint Paul, Minnesota, pp. 108-113.

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1. In the "effective alluvial aquifer" the specified draw-down limit is one-half foot. For all areas outside the effective alluvial valley, including the Belleville formation, the specified draw-down limit is 1/10 of a foot.
2. For the Belleville formation, a storage coefficient of 0.15 should be used. For all other areas, a storage coefficient of 0.20 should be used.
3. The average transmissivity for the effective alluvial valley is considered to be 100,000 gallons per day per foot.

The average transmissivity for the Belleville formation is considered to be 190,000 gallons per day per foot.

These values for transmissivity shall be used for all computations unless an acceptable stratigraphic log is available so that the lithologic codes in Table 1 (Attachment B) and the hydraulic conductivities in Table 2 (Attachment C) can be used, or other better or more site specific data is available.

II. <u>Analysis to determine if groundwater is available for appropriation in the effective alluvial corridor.</u>

A. The sum of all groundwater vested rights, groundwater rights, and approvals of applications to appropriate groundwater in the effective alluvial valley of the Lower Republican Basin shall not exceed 60,200 acre feet.

B. 1. If the proposed well is located in the effective alluvial valley, a Theis Analysis shall be done to determine the one-half foot draw-down radius of the proposed well. A 60 day pumping period is assumed to be reasonable for irrigation unless there is clearly evidence to the contrary. For all other beneficial uses, a reasonable pumping time shall be assumed.
2. Determine all senior wells whose one-half foot level draw-down radii intersect the one-half foot draw-down radius of the proposed well.
3. Determine the total area in the overlapping draw-down circles.
4. Determine the effective recharge from precipitation for this area by using the potential average annual recharge from precipitation shown in figure 1 (Attachment D).
5. For each well in the total areas of overlapping draw-down circles the cumulative volume of stream depletion that occurs in the 365 day period after the day pumping began shall be determined by conducting a Jenkins Stream Depletion Analysis, as described in Jenkins, C.T., 1970, Computation of Rate and Volume of Stream Depletion by Wells, Techniques of Water-Resources Investigations of the United States Geological Survey, Book 4, Chapter D1, U.S. Government Printing Office, 17 pp. The same pumping period, T and S parameters used in the previous Theis Analysis shall be used. The distance from the center of a well to the nearest location of the centerline of the Republican River as shown on the most current U.S.G.S seven and one half minute topographic map shall be used.

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6. Add: (a) the net effective recharge from precipitation for the overlapping wells and (b) the total recharge from stream depletion for the overlapping wells. From this total subtract the total quantity of water authorized, or proposed to be authorized, by the overlapping wells, including the proposed well. If the number is negative, there is not sufficient water available for the appropriation as proposed. If the number is zero or positive, the amount proposed for appropriation is available.

III. Analysis to determine if surface water is available from the Lower Republican River Basin.

A. Each application to appropriate surface water for direct diversion from the Lower Republican River Basin, and its tributaries within the Lower Republican River Basin, shall be approved if it does not impair existing water rights nor prejudicially and unreasonably affect the public interest. No new permits to appropriate water shall be issued for appropriations that will be primarily dependent on surface water return flows from the Bostwick irrigation district.

B. Every application to appropriate surface water for direct diversion which is approved by the chief engineer shall be subject to the following conditions:
The approval of application or water right for direct diversion of surface water shall not be exercised if:
   1. Exercising the approval of application or water right causes impairment of senior water rights or senior approvals of applications.
   2. The Kansas Water Office has requested that junior water rights be administered to meet the minimum desirable stream flow rates at the gage at Clay Center on the Lower Republican River;
   3. The proposed point of diversion is above the Concordia minimum desirable stream flow gage and the Kansas Water Office has requested that junior water rights be administered to meet the minimum desirable streamflows at Concordia; or
   4. the Chief Engineer is enforcing the terms of paragraph 6(b) of the Milford Water Reservation Right, identified as File No. 22,197-AR-6.

C. Applications to appropriate surface water from tributaries to the mainstem of the Lower Republican by means of dams may be approved only if the approval will not result in impairment of existing rights, nor prejudicially and unreasonably affect the public interest. Any dam permitted on an ephemeral stream shall meet the requirements of K.A.R. 5-40-1 *et seq.* and be equipped with a controlled outlet with a minimum diameter of four inches. Any dam permitted on an intermittent or perennial stream shall be equipped with a controlled outlet with a minimum diameter of four inches. The controlled outlet shall be placed to allow water to pass through the dam at or near streambed elevation.

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IV. Administration of direct diversion of surface water rights in Lower Republican River Basin.

A) Every application to directly divert surface water from the mainstem of the Lower Republican River Basin that has a priority on or after November 28, 1994 may be exercised unless:

1. use of the approval of application or water right causes impairment of other water rights;
2. the Kansas Water Office has requested that junior water rights be administered to meet the minimum desirable stream flow rates at the gage at Clay Center on the Lower Republican River;
3. the proposed point of diversion is above the Concordia minimum desirable stream flow gage and the Kansas Water Office has requested that junior water rights be administered to meet the minimum desirable streamflows at Concordia; or
4. the Chief Engineer is enforcing the terms of paragraph 6(b) of the Milford Water Reservation Right, identified as File No. 22, 197-AR-6.

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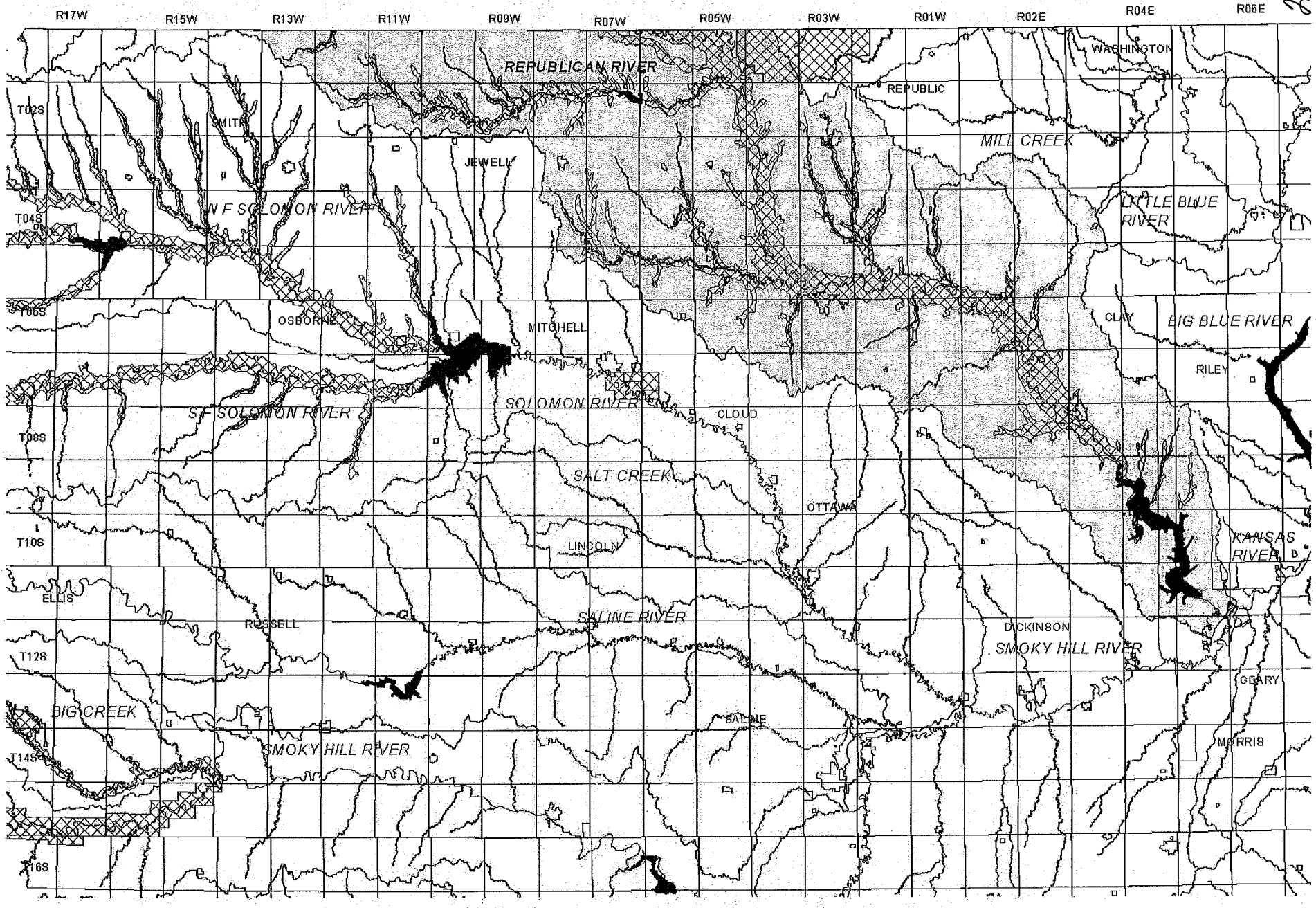
R17W
R15W
R13W
R11W
R09W
R07W
R05W
R03W
R01W
R02E
R04E
R06E
T02S
T04S
T06S
T08S
T10S
T12S
T14S
T16S
REPUBLICAN RIVER
WASHINGTON
REPUBLIC
SMITH
JEWELL
MILL CREEK
LITTLE BLUE RIVER
N F SOLOMON RIVER
OSBORNE
MITCHELL
CLAY
BIG BLUE RIVER
RILEY
S F SOLOMON RIVER
SOLOMON RIVER
CLOUD
SALT CREEK
OTTAWA
LINCOLN
KANSAS RIVER
ELLIS
RUSSELL
SALINE RIVER
DICKINSON
SMOKY HILL RIVER
GEARY
BIG CREEK
SALINE
MORRIS
SMOKY HILL RIVER

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K.A.R. 5-3-11(d)(6)

Table 1

LITHOLOGIC LOG CODES'

CLAY
SILT
SILTY CLAY
SANDY CLAY
SAND
VERY FINE SAND
FINE SAND
MEDIUM SAND
COARSE SAND
VERY COARSE SAND
GRAVEL
FINE GRAVEL
MEDIUM GRAVEL
COARSE GRAVEL
VERY COARSE GRAVEL
SAND & GRAVEL

* From Kansas Department of Health and Environment Water Well Records.

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Attachment C

K.A.R. 5-3-11(d)(6)

Table 2

Hydraulic Conductivities Assumed
for the
Lower Republican River Basin
and Belleville Formation

Lithologic Code	Hydraulic Conductivity (feet per day)	
Clay	1	
Silt	1	*
Silty Clay	1	*
Sandy Clay	1	*
Sand	105	**
Very Fine Sand	3	
Fine Sand	15	
Medium Sand	50	
Coarse Sand	250	
Very Coarse Sand	700	
Gravel	800	
Fine Gravel	900	
Medium Gravel	950	
Coarse Gravel	1000	
Very Coarse Gravel	1050	
Sand and Gravel	528	***(587 in Belleville formation)

* Assumed to be not much different than Clay.
** Average of Fine Sand, Medium Sand, and Coarse Sand.
*** Average of Fine Sand, Medium Sand, Coarse Sand, Fine Gravel, Medium Gravel and Coarse Gravel. Belleville formation hydraulic conductivity of 587 feet per day is previously described in the report.

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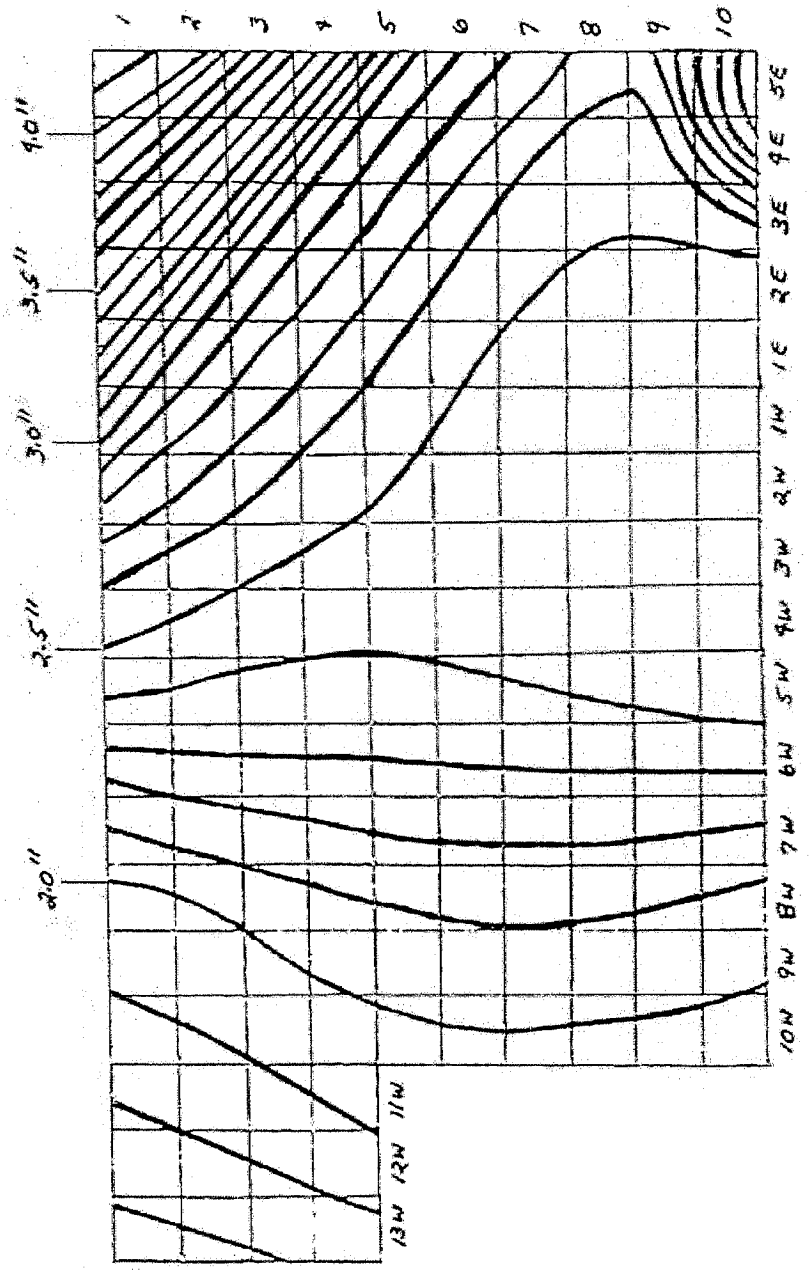
Figure 1

Potential Mean Annual Precipitation Recharge



5-22-7. Safe yield. ***Groundwater Management District No. 2.***

(a) Except as specified in subsection (b), the approval of each application for a change in the point of diversion, term permit, and permit to appropriate water for beneficial use shall be subject to the following requirements:

(1) The sum of prior appropriations shall include all of the following:

(A) The proposed application;

(B) vested rights;

(C) appropriation rights;

(D) term permits;

(E) earlier priority applications; and

(F) baseflow nodes.

The sum of prior appropriations shall not exceed the allowable safe-yield amount for the area of consideration. The non-consumptive use of groundwater previously authorized by the chief engineer shall be excluded from the sum of prior appropriations.

(2) The quantity authorized on all prior permits, certificates, and vested rights, the quantity requested on prior applications, and the quantities allocated to baseflow nodes shall be used to calculate the sum of prior appropriations and baseflow allocations.

(3) All conditions and limitation clauses listed on all prior appropriations and applications in the area of consideration shall be considered in effect.

(4) The baseflow allocation for baseflow nodes shall be calculated using the formula Qa = T/N where:

(A) Qa is the baseflow allocation per baseflow node in acre-feet per year;

(B) T is the total baseflow allocation for a reach of a stream in acre-feet per calendar year. T is the average of the 12 calendar months' daily flow values in cubic feet per second that were equaled or exceeded 90 percent of the time during a specifically designated hydrologically significant period of record, times a factor of 724; and

(C) N is the number of baseflow nodes established on a stream or reach of a stream. Nodes are located at the upstream end of the watercourse reach and thereafter at the intersection of the channel of a watercourse and an arc of a 1,320 foot-radius circle whose center is located on the previously established baseflow node.

(5) The allowable safe-yield amount shall be calculated using the formula S = A x K where:

(A) S is the allowable safe-yield amount in acre-feet per year;

(B) A is the area of consideration; and

(C) K is an aquifer recharge value in feet. Everywhere in the district, except in McPherson county, K is equal to 0.5 feet per year. In McPherson county, K is a constant equaling 0.25 feet per year. K is calculated by multiplying the recharge percentage, which is 10 percent in McPherson county and 20 percent for the rest of the district, times the average annual precipitation of 2.5 feet per year.

(6) When evaluating an application for a change in the point of diversion, each application with a priority earlier than the priority established by the filing of the application of change shall be included in the safe-yield analysis.

(7) If the perimeter of the area under consideration intersects a group of wells authorized under prior applications, permits, certificates, or vested rights, a reasonable quantity of water shall be assigned to each well based upon the best available information.

(b) The following shall not be subject to this regulation:

(1) An application to appropriate groundwater in an area not closed by regulation or intensive groundwater use control area order by the chief engineer to new non-domestic, non-temporary permits and term permits for five or fewer years, if all of the following conditions are met:

(A) The annual quantity of water requested in the application does not exceed 15 acre-feet;

(B) the sum of the annual quantity of water requested in the application and the total annual quantities of water authorized by prior approvals of applications allowed because of an exemption pursuant to this regulation does not exceed 45 acre-feet in a two-mile-radius circle surrounding the proposed point of diversion;

(C) the approval of the application does not authorize an additional quantity of water out of an existing authorized point of diversion with a nondomestic approval of application or water right that would then authorize a total combined annual quantity of water from that point of diversion in excess of 15 acre-feet;

(D) the approval of the application does not authorize an additional quantity of water to be used on a currently authorized non-domestic place of use in excess of 15 acre-feet;

(E) the approval of the application does not authorize an additional quantity of water to be pumped through a common distribution system in excess of 15 acre-feet;

(F) the application meets the well spacing criteria in K.A.R. 5-22-2; and

(G) the application meets the requirements of all other applicable regulations in effect when the application is filed;

(2) an application for a non-consumptive use of groundwater;

(3) an application for change in point of diversion, if the following conditions are met:

(A) The diversion works were completed 300 feet or less from the originally authorized point of diversion and within 150 feet of the location approved by the chief engineer; and

(B) a notice of completion was timely filed with the chief engineer under the original approval of application;

(4) an application requesting only an additional rate of diversion on an existing well, if the approval of the application meets the following requirements:

(A) Is limited to the maximum annual quantity of water authorized by a prior certified, vested, or appropriation right; and

(B) contains both of the following requirements:

(i) The approved application for additional rate shall be dismissed if the prior certified, vested, or appropriation right is dismissed and terminated; and

(ii) the approved or certified maximum annual quantity of water shall be reduced in an amount equal to any subsequent reduction in the maximum annual quantity of water authorized by the prior certified, vested, or appropriation right;

(5) an application for a standby well;

(6) an application for a bank storage well only to the extent that the bank storage well is withdrawing bank storage water; and

(7) an application for an aquifer storage and recovery well.

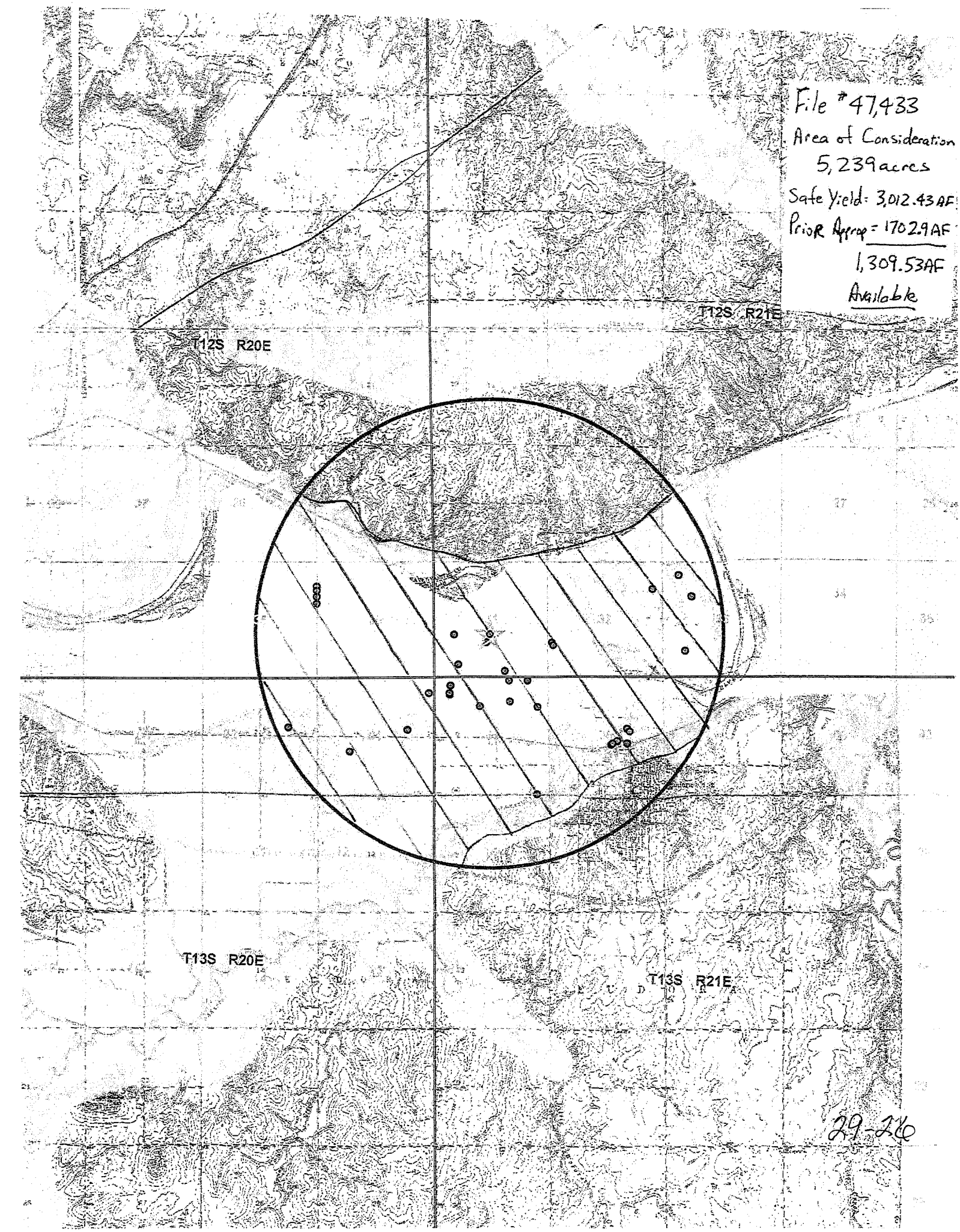
(Authorized by and implementing K.S.A. 82a-706a and K.S.A. 2008 Supp. 82a-1028; effective May 1, 1983; amended Oct. 15, 1990; amended March 7, 1994; amended Nov. 12, 2004; amended May 14, 2010.)

K.A.R. 5-22-1 (e) ***"Area of consideration"*** means the two-mile-radius circle whose center is the location of the proposed point of diversion. The area of consideration equals 8,042 acres minus the area of the circle that meets the following conditions:

(1) Is outside the district boundary;

(2) is inside an intensive groundwater use control area with a declining water table; and

(3) is in an area where the bedrock is not overlain by an aquifer.



File #47,433
Area of Consideration
5,239 acres
Safe Yield: 3,012.43 AF
Prior Approp = 1702.9 AF
1,309.53 AF
Available

29-2W

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Analysis Results

The selected PD is in an area OPEN to new appropriations.
The safe yield, based on the variables listed below is 3,012.43 AF.
Total prior appropriation in the circle is 1,794.40 AF. − 91.50 AF = 1702.9 AF
Total quantity of water available for appropriation is 1,218.03 AF.
1,309.53 AF

Safe Yield Variables

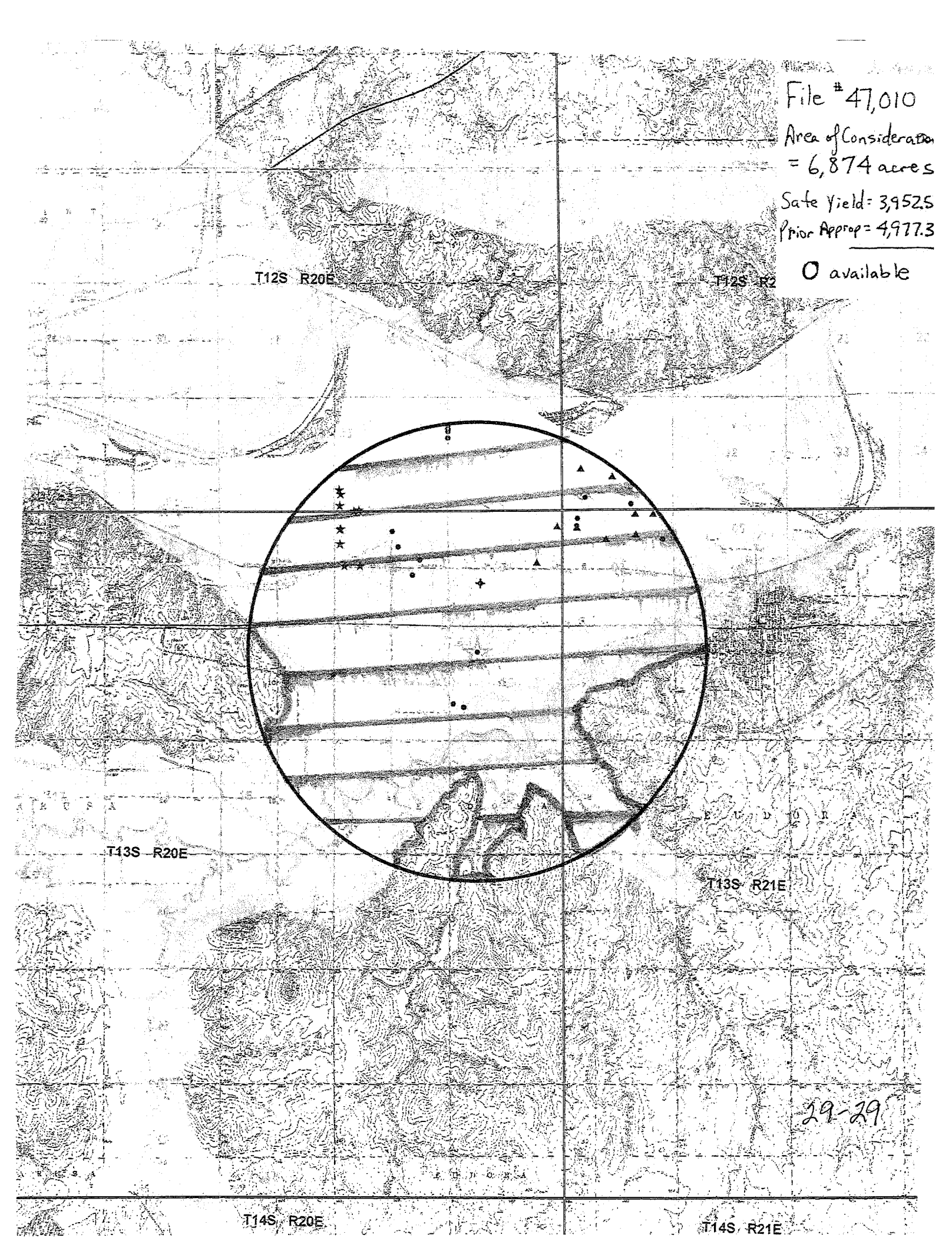
The area used for the analysis is set at 5239 acres.
Potential annual recharge of the area is estimated to be 9.2 inches.
The percent of recharge available for appropriation is 75%.

Authorized Quantity values are as of 21-SEP-2010 and are based on Appropriated and Vested ground water right and possible stream nodes for GMD #2. Domestic, Term and Temporary water rights have been excluded.

There are 21 water right(s) and 21 point(s) of diversion within the circle.

File	Number	Use	ST	SR	Q4	Q3	Q2	Q1	FeetN	FeetW	Sec	Twp	Rng	ID	Qind	Auth_Quant	Add_Quant	Tacres	Nacres
A	21420 00	MUN	NK	G		NW	NW	SE	2464	2112	05	13	21E	4	PD	53.03	53.03		
Same		MUN	NK	G		NW	NW	SE	2288	2376	05	13	21E	5	PD	79.48	79.48		
A	24621 00	IRR	NK	G		SE	NE	NE	4180	50	35	12	20E	4	WR	24.50	24.50	122.00	122.00
Same		IRR	NK	G		NE	SE	NE	3370	50	35	12	20E	7	WR				
Same		IRR	NK	G		NE	SE	NE	3680	50	35	12	20E	6	WR				
Same		IRR	NK	G		SE	NE	NE	3970	50	35	12	20E	5	WR				
A	24623 00	IRR	NK	G		CW	NE	SW	1960	3840	01	13	20E	1	WR	4.60	4.60	77.00	77.00
A	28326 00	IRR	NK	G		SW	SE	NE	3040	1315	02	13	20E	7	WR	36.00	36.00	36.00	36.00
A	29502 00	IRR	NK	G		CW	NE	SW	1960	3840	01	13	20E	1	WR	49.30	49.30	77.00	0.00
A	29503 00	IRR	NK	G		SE	NE	NE	4180	50	35	12	20E	4	WR	87.50	87.50	122.00	0.00
Same		IRR	NK	G		NE	SE	NE	3370	50	35	12	20E	7	WR				
Same		IRR	NK	G		NE	SE	NE	3680	50	35	12	20E	6	WR				
Same		IRR	NK	G		SE	NE	NE	3970	50	35	12	20E	5	WR				
A	29838 00	IRR	NK	G		SE	NW	NW	4070	4000	12	13	20E	1	WR	26.00	26.00	80.00	80.00
A	29914 00	IRR	NK	G		SE	NE	NE	4000	450	32	12	21E	1	WR	13.00	13.00	100.00	100.00
A	34786 00	IRR	NK	G		SE	SW	SE	300	1950	31	12	21E	1	WR	25.00	25.00	39.00	39.00
A	38063 00	MUN	NK	G		NW	NE	NE	5180	1003	06	13	21E	2	WR	214.14	113.00		
A	38064 00	MUN	NK	G		NE	NW	NE	5180	1855	06	13	21E	3	WR	190.70	141.97		
A	41650 00	IRR	NK	G					1449	4996	32	12	21E	3	WR	37.00	37.00	60.00	60.00

A	42939	00	MUN	LO	G		SE	NW	NE	4230	1820	06	13	21E	5	WR	245.51	245.51		
A	43665	00	IRR	KK	G		NC	E2	NE	3950	550	06	13	21E	6	WR	168.00	168.00	178.00	178.00
A	45283	00	IRR	LO	G		NE	SW	NW	3719	3974	33	12	21E	4	WR	171.00	171.00	180.00	180.00
A	45800	00	MUN	LO	G		SE	SE	NW	3870	3110	06	13	21E	7	WR	245.51	66.01		
A	46589	00	IRR	KE	G		NC	S2	SW	575	3960	31	12	21E	2	WR	150.00	150.00	150.00	150.00
A	46875	00	IRR	GY	G		SE	NW	NW	4613	4547	06	13	21E	9	WR	32.00	32.00	32.00	32.00
A	47008	00	IRR	AY	G		SE	NE	NE	4000	450	32	12	21E	1	WR	100.00	100.00	100.00	0.00
A	47010	00	IRR	AY	G		SE	NW	NW	4070	4000	12	13	20E	1	WR	80.00	80.00	80.00	0.00
A	47433	00	IRR	AY	G					1980	2640	31	12	21E	5	WR	~~91.50~~	~~91.50~~	91.50	51.50



File # 47,010

Area of Consideration = 6,874 acres

Safe Yield = 3,952.5

Prior Approp = 4,977.3

0 available

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KS River Alluvium
Extent of alluvium 6874 acres

Fully appropriated - Failed safe yield

29-30

Analysis Results

The selected PD is in an area OPEN to new appropriations.

The safe yield, based on the variables listed below is 3,952.55 AF.

Total prior appropriation in the circle is 5,057.30 AF. -80 = 4,977.3 AF

Total quantity of water available for appropriation is 0.00 AF.

Safe Yield Variables

The area used for the analysis is set at 6874 acres.

Potential annual recharge of the area is estimated to be 9.2 inches.

The percent of recharge available for appropriation is 75%.

Authorized Quantity values are as of 13-SEP-2010 and are based on Appropriated and Vested ground water right and possible stream nodes for GMD #2. Domestic, Term and Temporary water rights have been excluded.

There are 19 water right(s) and 25 point(s) of diversion within the circle.

File Number	Use	ST	SR	Q4	Q3	Q2	Q1	FeetN	FeetW	Sec	Twp	Rng	ID	Qind	Auth_Quant	Add_Quant	Tacres	Nacres
A 9314 00	IRR	NK	G		NW	SW	NE	0	0	02	13	20E	2	WR	102.00	102.00	143.00	143.00
Same	IRR	NK	G		NE	NW	SE	0	0	02	13	20E	1	WR				
A 9391 00	IND	NK	G					2778	4815	02	13	20E	3	WR	3,685.91	3,685.91		

Same			IND	NK	G				4453	5034	02	13	20E	9	WR	
Same			IND	NK	G				2771	4092	02	13	20E	4	WR	
Same			IND	NK	G	SW	SW	SW	283	5040	35	12	20E	1	WR	
Same			IND	NK	G	SE	SW	SW	24	4375	35	12	20E	8	WR	
Same			IND	NK	G				3794	5028	02	13	20E	5	WR	
Same			IND	NK	G	NW	SW	SW	1004	5063	35	12	20E	9	WR	
A	24621	00	IRR	NK	G	NE	SE	NE	3370	50	35	12	20E	7	WR	24.50	24.50	122.00	122.00
Same			IRR	NK	G	NE	SE	NE	3680	50	35	12	20E	6	WR	
Same			IRR	NK	G	SE	NE	NE	3970	50	35	12	20E	5	WR	
A	24623	00	IRR	NK	G	CW	NE	SW	1960	3840	01	13	20E	1	WR	4.60	4.60	77.00	77.00
A	28326	00	IRR	NK	G	SW	SE	NE	3040	1315	02	13	20E	7	WR	36.00	36.00	36.00	36.00
A	28595	00	IRR	NK	G	SW	NW	NE	4350	2580	02	13	20E	8	WR	23.00	0.00	143.00	0.00
A	29502	00	IRR	NK	G	CW	NE	SW	1960	3840	01	13	20E	1	WR	49.30	49.30	77.00	0.00
A	29503	00	IRR	NK	G	NE	SE	NE	3370	50	35	12	20E	7	WR	87.50	87.50	122.00	0.00
Same			IRR	NK	G	NE	SE	NE	3680	50	35	12	20E	6	WR				
Same			IRR	NK	G	SE	NE	NE	3970	50	35	12	20E	5	WR				
A	29838	00	IRR	NK	G	SE	NW	NW	4070	4000	12	13	20E	1	WR	26.00	26.00	80.00	80.00
A	34786	00	IRR	NK	G	SE	SW	SE	300	1950	31	12	21E	1	WR	25.00	25.00	39.00	39.00
A	38063	00	MUN	NK	G	NW	NE	NE	5180	1003	06	13	21E	2	WR	214.14	113.00		
A	38064	00	MUN	NK	G	NE	NW	NE	5180	1855	06	13	21E	3	WR	190.70	141.97		
A	40333	00	IRR	NK	G	SW	NW	SW	1520	4635	12	13	20E	3	WR	20.00	20.00	20.00	20.00
A	42939	00	MUN	LO	G	SE	NW	NE	4230	1820	06	13	21E	5	WR	245.51	245.51		
A	43665	00	IRR	KK	G	NC	E2	NE	3950	550	06	13	21E	6	WR	168.00	168.00	178.00	178.00
A	45800	00	MUN	LO	G	SE	SE	NW	3870	3110	06	13	21E	7	WR	245.51	66.01		
A	46589	00	IRR	KE	G	NC	S2	SW	575	3960	31	12	21E	2	WR	150.00	150.00	150.00	150.00
A	46875	00	IRR	GY	G	SE	NW	NW	4613	4547	06	13	21E	9	WR	32.00	32.00	32.00	32.00
A	47010	00	IRR	AY	G	SE	NW	NW	4070	4000	12	13	20E	1	WR	80.00	80.00	80.00	0.00

,uus Beds Groundwater Management District

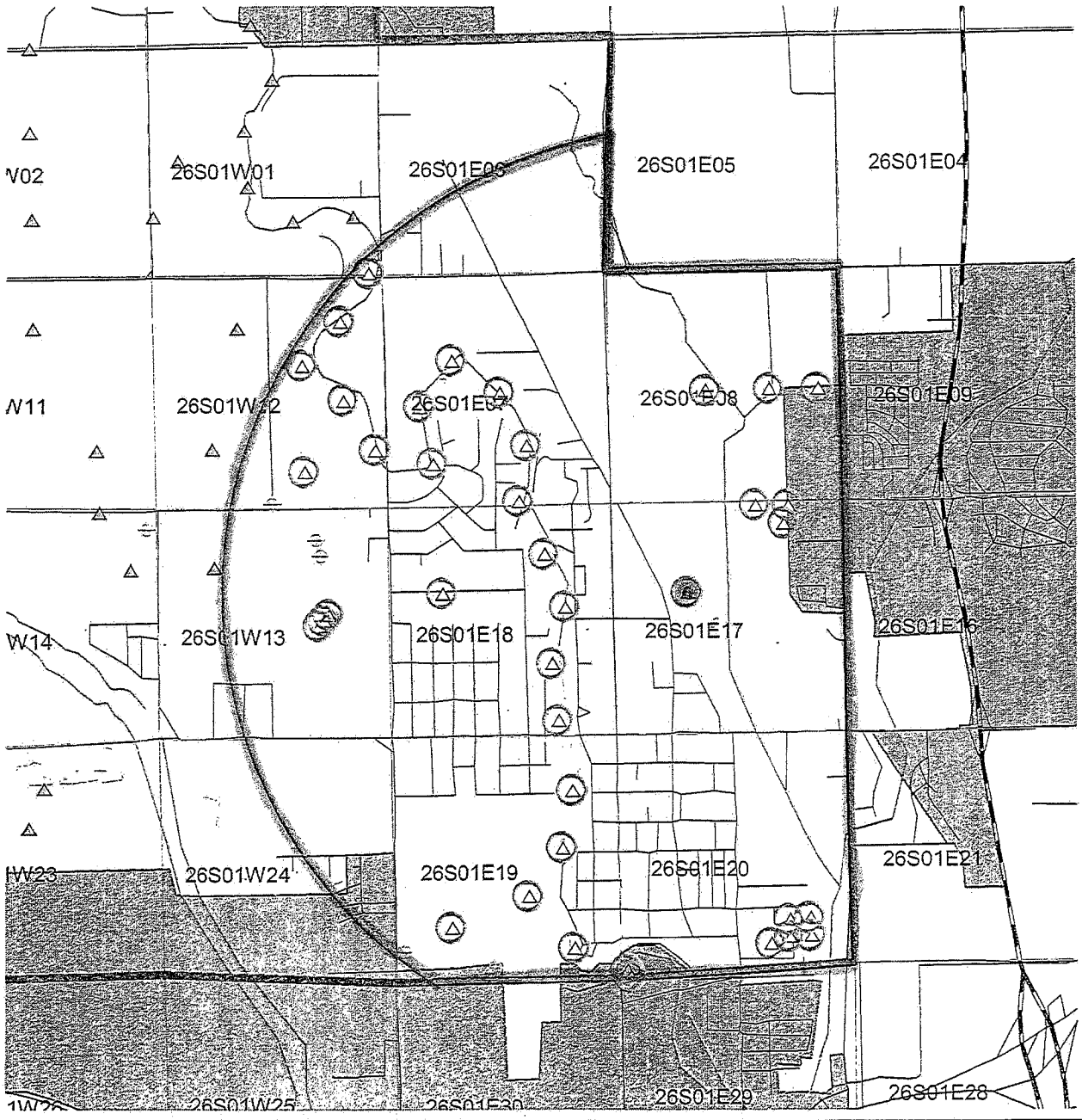
2-mile ci does not extend beyond GMD boundary

Safe Yield Evaluation - #47499 - Park City Properties

SW-SE-NW (3235' N & 3655' W) Sec. 17, T26S, R1E, Sedgwick County.

Prepared By: T. Boese **Date: 07/12/2010**

Fails safe yield



Map Legend

- Proposed Point of Diversion
- Points of Diversion
- MonitoringWells
- District Boundary
- Sections
- Area of Consideration Boundary

Roads
- Major Highway
- Other Roadway

Streams
- Major Stream
- Other Water Feature

Cities

Permian Bedrock Outcrop

0.5 0 0.5 Miles

WATER RESOURCES RECEIVED JUL 14 20

29-32

SAFE YIELD EVALUATION - #47499 - PARK CITY PROPERTIES
LOCATION - SW-SE-NW (3235' N & 3655' W) SEC. 17, T26S, R1E, SEDGWICK COUNTY
SPECIAL USE AREA - NONE
EVALUATION DATE - 12 JULY 2010

Total Area: 5052.56 acres ; Area in 3 inch discharge zone: 0 acres ; Area in 6 inch discharge zone: 5052.56 acres

FILE_ID	WELL_ID	TOWNSHIP	RANGE	SECTION	QUALIFIER	USE	AUTHQUANTITY
A03532900	26	26S	01E	8	NENESE	MUN	190
A00404800	1057	26S	01E	20	6540980	MUN	95.31
A00404800	1058	26S	01E	20	10751000	MUN	68.65
A00404800	1059	26S	01E	20	10401475	MUN	95.96
A00404800	1060	26S	01E	20	6401475	MUN	65.39
A03532800	1106	26S	01E	8	NENWSE	MUN	190
A01589700	1174	26S	01E	8	25481705	MUN	204
A03714500	1210	26S	01E	20	5801931	MUN	150
A01252200	1369	26S	01W	12	8501875	IRR	70
A02766400	1497	26S	01E	8	25370558	MUN	106
A02766400	1498	26S	01E	8	25333164	MUN	180
A01074200	1542	26S	01E	18	32923884	IRR	70
A00351600	1659	26S	01E	17	NWNENE	MUN	153.66
A00351600	1660	26S	01E	17	51821311	MUN	153.66
A00351600	1661	26S	01E	17	NENWNE	MUN	153.66
VC116	2099	26S	01W	1	500300		104
VC117	2100	26S	01W	12	42501075		104
VC118	2101	26S	01W	12	32501950		104
VC119	2102	26S	01W	12	24501000		104
VC120	2103	26S	01W	12	13250275		104
VC121	2104	26S	01E	7	10004050		104
VC122	2105	26S	01E	7	23004350		104
VC123	2106	26S	01E	7	33503625		104
VC124	2107	26S	01E	7	26252525		104
VC125	2108	26S	01E	7	14251925		104
VC126	2109	26S	01E	7	1502100		104
VC127	2110	26S	01E	18	42001625		104
VC128	2111	26S	01E	18	30001150		104
VC129	2112	26S	01E	18	17001450		104
VC130	2113	26S	01E	18	4001300		104
VC131	2114	26S	01E	19	43751100		104
VC132	2115	26S	01E	19	30751325		104
VC133	2116	26S	01E	19	19752100		104
VC134	2117	26S	01E	19	8001050		104
VC136	2118	26S	01E	20	2005200		104
A04749900	3652	26S	01E	17	32353655	IND	25.3
A04347100	2611	26S	01E	19	12303820	REC	154.4
A00174600	2804	26S	01E	20	475143	IND	645.5
A04647400	3360	26S	01W	13	26951488.5	IRR	12.19
A04647400	3361	26S	01W	13	25701600	IRR	0
A04647400	3362	26S	01W	13	28201377	IRR	0

stream nodes

Small User Quantity	12.19	Total Existing Appropriations	4863.68
Remaining SUQ	32.81	Non Consumptive Appropriatio	0.00
		Consumptive Appropriations	4863.68
Note - Values in acre-feet		Allowable Appropriations	2526.28

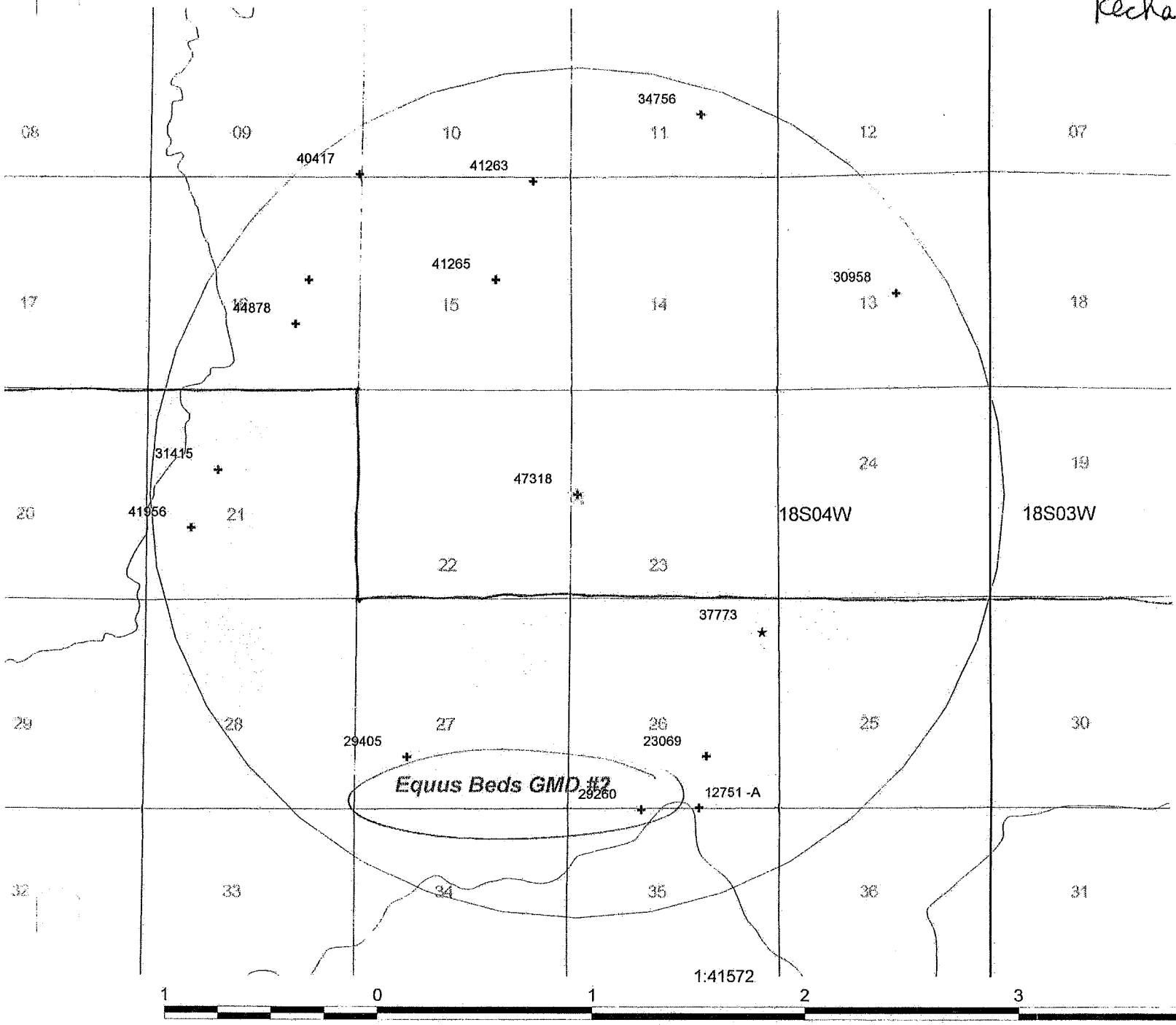
29-33

Water Right Number, 47318-00, With A 2 Mile Buffer

Just outside GMD 2 boundary

Recharge only 2.4"

29-34



PD
- Ground Water
- Surface Water
- Queried PD(s)

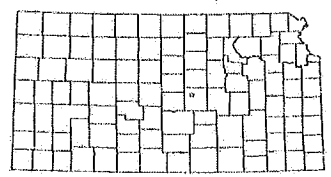
Subbasins
Hydrology

Special Areas
- Closed
- Restricted

PLSS
- Section Corners

Townships
Cities
Towns
Lakes
GMD

Index Map



This map was created by WIMAS on Sep 27, 2010 and represents water right conditions as of 09/25/2010.

1:41572

1 0 1 2 3 4 Miles

SAFE Yield for 41,510

47,318 met safe Yield and was approved on 6/15/2009

19-35

Safe Yield Report Sheet.
Water Right Number, 47318-00, With A 2 Mile Buffer.
Point of Diversion located in 23-18S-4W 2.

Analysis Results

The selected PD is in an area OPEN to new appropriations.
The safe yield, based on the variables listed below, is 1206.30 AF.
Total prior appropriations in the circle is ~~1333.33 AF~~. − 122.6 − 137.55 AF = 1,073.18
Total quantity of water available for appropriation is ~~0.00~~ 133.12 AF.

Safe Yield Variables

The area used for the analysis is set at 8042 acres.
The potential annual recharge of the area is estimated to be 2.4 inches.
The percent of calculated recharge available for appropriation is 75 %.

Authorized Quantity values are as of 09/25/2010 and are based on Appropriated and Vested ground water rights and possible stream nodes for GMDs. Domestic, Term and Temporary water rights have been excluded.

There are 14 water right(s) and 14 point(s) of diversion within the circle.

File	Number	Use	ST	SR	Q4	Q3	Q2	Q1	FeetN	FeetW	Sec	Twp	Rng	ID	Qind	Auth_Quant	Add_Quant	Tacres	Nacres
A	12751 A	IRR	NK	G		CN	NW	NE	0	0	35	18	4W	1	WR	96.00	96.00	70.00	70.00
A	23069 00	IRR	NK	G		NE	SW	SE	1300	1820	26	18	4W	1	WR	104.00	104.00	115.00	115.00
A	29260 00	IRR	NK	G		NW	NE	NW	5220	3950	35	18	4W	3	WR	169.00	169.00	156.00	156.00
A	29405 00	IRR	NK	G			NC	SW	1320	3960	27	18	4W	1	WR	189.00	189.00	130.00	130.00
A	30958 00	REC	NK	G		NW	NW	SE	2340	2310	13	18	4W	1	WR	46.00	46.00	0.00	0.00
A	31415 00	IRR	NK	G		SW	SE	NW	3250	3420	21	18	4W	2	WR	102.00	102.00	69.00	69.00
A	34756 00	IRR	NK	G	NC	S2	SW	SE	1570	1900	11	18	4W	1	WR	45.00	45.00	118.00	118.00
A	40417 00	MUN	LO	G		SW	SW	SW	100	5180	10	18	4W	1	WR	56.16	56.16	0.00	0.00
A	41263 00	MUN	LO	G		NW	NE	NE	5200	930	15	18	4W	1	WR	300.00	80.50	0.00	0.00
A	41265 00	MUN	LO	G		SE	SW	NE	2740	1940	15	18	4W	2	WR	300.00	0.00	0.00	0.00
A	41956 00	IRR	NK	G		SE	NW	SW	1812	4098	21	18	4W	3	WR	176.00	176.00	399.00	0.00
A	44878 00	IND	NK	G		SE	NW	SE	1669	1535	16	18	4W	1	WR	9.52	9.52	0.00	0.00
A	47318 00	IRR	GY	G		SW	SW	NW	2645	5000	23	18	4W	2	WR	~~122.60~~	~~122.60~~	104.00	104.00
A	~~47333 00~~	~~IND~~	~~AY~~	~~G~~			N2	SE	2750	1200	16	18	4W	2	WR	~~137.55~~	~~137.55~~	0.00	0.00

NORTHWEST KANSAS GROUNDWATER MANAGEMENT DISTRICT NO. 4

Fax: (785) 462-2693
E-mail: wab@gmd4.org
URL: www.gmd4.org

1175 South Range Avenue
P O Box 905
Colby, Kansas 67701-0905
(785) 462-3915

Reduction in Qty of senior file.

April 16, 2009

Douglas Schemm
Division of Water Resources
109 SW 9th Street
2nd Floor
Topeka KS 66612-1283

RE: Applications: 900; 38,471; 47,266

Dear Mr. Schemm

The Northwest Kansas Groundwater Management District has reviewed the above referenced application and based on our records and the information supplied by the applicant, we have determined that the following recommendations be made to the Chief Engineer:

Application Number: 900
Approve application to reduce water right to 66 acre-feet – provided 47,266 is approved for an additional 14 acre-feet.

Application Number: 38,471
Approve Place of Use Reduction – provided 47,266 is approved.

Application 47,266
Approve for additional 14 acre-feet – provided 900 is reduced to 66 acre-feet

Sincerely

Ray P. Luhman

Ray Luhman
Assistant Manager

pc: Stockton Field Office

WATER RESOURCES
RECEIVED
APR 20 2009
KS DEPT OF AGRICULTURE

29-36

Report Date Wednesday, March 25 2009

Water Rights and Points of Diversion Within 2.00 miles of point defined as:
5115 ft N and 95 ft W of the SE Corner of Section 29, T 3S, R 40W
Located at: 101.824374 West Longitude and 39.770832 North Latitude
GROUNDWATER ONLY

File Number	Use	ST	SR	Dist (mi)	Q4	Q3	Q2	Q1	FeetN	FeetW	Sec	Twp	Rng	ID	Auth_Quan	Add_Quan	Unit
A 900	00	IRR	NK	G .40	NC	S2	NW	NE	4272	2020	29	3	40W	5	80.00	80.00	AF
Same				.41	NC	S2	NW	NE	4220	2070	29	3	40W	6			
Same				.39	NC	S2	NW	NE	4324	1970	29	3	40W	8			
A 1950	00	IRR	NK	G 1.25	--	SW	SW	NW	----	----	22	3	40W	5	50.00	50.00	AF
A 2746	00	IRR	NK	G .62	--	SW	NW	NE	----	----	28	3	40W	1	25.00	25.00	AF
A 3246	00	IRR	NK	G .74	--	NW	NW	SE	2210	2375	21	3	40W	2	30.00	30.00	AF
A 4212	00	MUN	NK	G .95	--	NE	SE	SE	825	550	21	3	40W	4	61.38	61.38	AF
Same				.78	--	NW	NE	NE	4980	1280	28	3	40W	2	36.83	36.83	AF
A 5769	00	IRR	NK	G .74	--	NW	NW	SE	2210	2375	21	3	40W	2	9.00	9.00	AF
A 9175	00	IRR	NK	G .66	--	NW	SW	NE	----	----	28	3	40W	3	45.00	45.00	AF
A 9744	00	IRR	NK	G .97	--	NE	NW	SW	2300	4350	29	3	40W	2	82.00	82.00	AF
A 17331	00	IRR	NK	G .74	--	NW	NW	SE	2210	2375	21	3	40W	2	111.00	111.00	AF
A 17424	00	IRR	NK	G .63	--	NW	NE	SW	----	----	28	3	40W	4	100.00	100.00	AF
A 20216	00	IRR	NK	G 1.46	--	--	W2	NW	4200	4600	32	3	40W	1	80.00	80.00	AF
A 24471	00	IRR	NK	G 1.06	--	SW	SE	NE	3100	900	21	3	40W	7	118.00	118.00	AF
A 27823	00	IRR	NK	G 1.69	--	SW	SW	NW	3000	4950	32	3	40W	2	100.00	100.00	AF
Same				1.68	--	SW	SW	NW	3060	4970	32	3	40W	5			
Same				1.69	--	SW	SW	NW	3000	4950	32	3	40W	6			
Same				1.69	--	SW	SW	NW	2940	4910	32	3	40W	7			
A 28823	00	IRR	NK	G 1.36	--	SE	SW	NW	2800	4125	22	3	40W	6	6.30	6.30	AF
A 31048	00	IRR	NK	G .43	--	NW	SE	NW	3700	3650	28	3	40W	5	90.00	90.00	AF
A 34531	00	IRR	NK	G 1.84	--	NW	NW	NE	4747	2263	22	3	40W	7	2.21	2.21	AF
A 36613	00	IRR	NK	G .93	--	NW	SW	SE	800	2440	29	3	40W	3	78.00	78.00	AF
A 38471	00	IRR	NK	G .03	--	SE	SE	SE	15	100	20	3	40W	1	13.00	13.00	AF
Same				.02	--	NE	NE	NE	4995	100	29	3	40W	4			
Same				.01	--	NE	NE	NE	5145	100	29	3	40W	9			
A 40832	00	IND	LR	G .55	--	NE	SE	SW	700	2700	21	3	40W	8	25.01	25.01	AF
VCN 2	00	MUN	AA	G .78	--	NW	NE	NE	4980	1280	28	3	40W	2	30.69	30.69	AF
A 1173	D1	IRR	NK	G .97	--	NE	NW	SW	2300	4350	29	3	40W	2	26.00	26.00	AF
A 1173	D2	IRR	NK	G .93	--	NW	SW	SE	800	2440	29	3	40W	3	26.00	26.00	AF
T 20089069	00	IRR	GY	G .01	--	NE	NE	NE	5145	100	29	3	40W	9	20.00	20.00	AF
A 47266	00	IRR	AY	G .03	--	SE	SE	SE	15	100	20	3	40W	1	14.00	14.00	AF
Same				.02	--	NE	NE	NE	4995	100	29	3	40W	4			
Same				.01	--	NE	NE	NE	5145	100	29	3	40W	9			

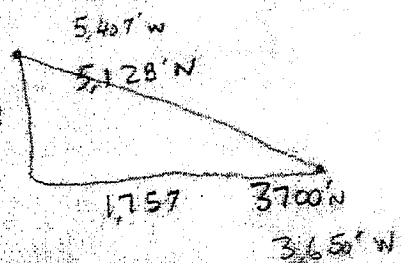
Total Net Quantities Authorized:	Direct	Storage
Total Requested Amount (AF) =	14.00	.00
Total Permitted Amount (AF) =	20.00	.00
Total Inspected Amount (AF) =	25.01	.00
Total Pro_Cert Amount (AF) =	.00	.00
Total Certified Amount (AF) =	1169.72	.00
Total Vested Amount (AF) =	30.69	.00
TOTAL AMOUNT (AF) =	1259.42	.00

An * after the source of supply indicates a pending application for change for the file number

Water Rights and Points of Diversion Within 2.00 miles of point defined as:

Applicant's well

$\angle \frac{1}{2}$ mile



3087049 29-37

KANSAS DEPARTMENT OF AGRICULTURE
Division of Water Resources

MEMORANDUM

TO: Files **DATE:** April 21, 2009

FROM: Doug Schemm **RE:** Water Rights - File Nos. 900 and 38,471; and New Application - File No. 47,266

Pat Stuart has filed the new application referenced above (File No. 47,266) to appropriate 14 acre-feet of groundwater per calendar year at a diversion rate of 200 gallons per minute for irrigation use on 18 acres. In conjunction with the new application, a Reduction in the Authorized Quantity of Water has been filed on Water Right, File No. 900, and a Reduction in the Size of the Authorized Place of Use has been filed on Water Right, File No. 38,471. File Nos. 38,471 and 47,266 will overlap in point of diversion and place of use. The applicant is the owner of the place of use.

Water Right, File No. 900 is authorized a quantity of 80 acre-feet at a diversion rate of 350 gallons per minute. The applicant has requested that the authorized quantity of water for Water Right, File No. 900 be reduced to 66 acre-feet, providing a difference of 14 acre-feet, the same quantity as requested on the new application. The requested reduction in quantity was filed so that the new application could be processed. K.A.R. 5-24-2 states that the allowable withdrawal regulation does not apply to:

> "Applications for a permit to appropriate water requesting a quantity of water equal to or less than that quantity of water which will be conjunctively reduced from the currently available quantity under an existing water right or water rights within one-half mile of the proposed point of diversion."

Water Right, File No. 900 is located within the same section, less than one-half mile from the proposed point of diversion, and diverts water from the same source of supply. As noted above, the requested reduction in quantity for File No. 900 is equal to the requested quantity under Application, File No. 47,266. Therefore, K.A.R. 5-24-2 does not apply.

Water Right, File No. 38,471 is authorized a quantity of 13 acre-feet at a diversion rate of 95 gallons per minute for irrigation use on 25 acres. The applicant has requested that the authorized place of use for Water Right, File No. 38,471 be reduced to 18 acres. The new application will be limited to 200 gallons per minute when combined with Water Right, File No. 38,471, resulting in an additional rate of diversion of 105 gallons per minute (200 gpm – 95 gpm). The requested quantity of water will be all additional. The combined total of 27 acre feet (13 AF + 14 AF) is reasonable to irrigate 18 acres in Cheyenne County, which is the maximum allowed at 1.5 acrefeet per acre.

The applicant had previously filed Term Permit, File No. 20089069 to temporarily accomplish this same project for irrigation use last year. This term permit expired on December 31, 2008. Approval of the new application and related reductions will effectively result in a permanent solution to the applicant's irrigation needs.

The point of diversion is comprised of a battery of two wells with a geographic center located in the Northeast Quarter of Section 29, Township 3 South, Range 40 West, Cheyenne County. The feet distances north and west for the individual wells comprising the battery as listed on the new application differ from the current description of the well locations under Water Right, File No. 38,471. Further discussion indicates that the revised locations were based on updated Global Positioning System measurements, and more accurately describe the well locations. The point of diversion for Water Right, File No. 38,471 will be modified based on this new information as part of the reduction order.

29-38

KANSAS DEPARTMENT OF AGRICULTURE
Division of Water Resources
MEMORANDUM

South Central KS Unit Area

TO: Files **DATE:** January 27, 2010

FROM: Doug Schemm **RE:** Application - File No. 45,005

The referenced new application was filed by Bradford L. Shotton and received in our office on February 25, 2002. The application has been held for several years to allow for final processing of three senior files (File Nos. 40,700; 40,701; and 41,936), which impacted safe yield evaluation for this pending file because all four files are within the same designated unit area (SFA-64). The original application had requested 195 acre-feet of groundwater per calendar year, to irrigate 130 acres at a diversion rate not to exceed 700 gallons per minute. However, with the processing of the senior files, safe yield calculations (see below) provide only 142 acre-feet available for appropriation. The applicant was informed of this, and agreed to reduce his quantity of water to 142 acre-feet and proposed acreage to 95 acres to stay within current reasonable irrigation guidelines (i.e. 1.5 AF/acre).

The point of diversion is located within South-Central Kansas Designated Unit Area SFA-64 (Salt Fork Arkansas). Therefore, safe yield must be evaluated both on the availability of water within the overall designated unit area, and the more standard two-mile radius circle. Based on K.A.R. 5-3-11, CHK-6 encompasses an area of 90,035 acres, with 1.3 inches per year of recharge, resulting in 9,754 acre-feet of recharge quantity. Allowing for 50% available for appropriation, results in an original water quantity available (Safe Yield) of 4,877 acre-feet/year. Current groundwater appropriations in SFA-64 total 4,735.11 acre-feet, leaving 142 acre-feet available for appropriation (4,877 AF – 4,735 AF).

The WRIS database shows there are no other water rights, other than the applicant's pending application within a two-mile radius circle. The two-mile radius circle safe yield based on 8,042 acre area of consideration, 1.3 inches of recharge, and 50% available for appropriation, is 435.63 acre-feet. The pending application requesting only 142 acre-feet would clearly meet safe yield based on this two-mile radius circle calculation as well. There are no wells located within one-half (½) mile of the proposed point of diversion, therefore no nearby well owner letters were required. The proposed point of diversion complies with minimum well spacing requirements.

The requested quantity of 142 acre-feet appears to be reasonable to irrigate 95 acres in Comanche County, Kansas, as provided by K.A.R. 5-3-24, which allows 1.5 acre-feet per acre. The requested rate of 700 gallons per minute also appears reasonable based on the area of the place of use and the proposed irrigation system, which is a small center pivot system.

In accordance with K.S.A. 82a-706c, the Chief Engineer retains full authority to require any water user to install meters, gages, or other measuring devices, which devices he or she or his or her agents may read at any time. Water flowmeter requirements are further described in K.A.R. 5-1-4 through K.A.R. 5-1-12. If any chemical or foreign substance is injected into the water pumped under this permit, a check valve will also need to be installed. A rate greater than 100 gallons per minute has been proposed, so a water level measurement tube will be required on the well.

The requested point of diversion is not located within the boundaries of any Groundwater Management District. In an e-mail message, dated January 27, 2010, Jeff Lanterman, Acting Water Commissioner, Stafford Field Office, indicated he had no objection to the approval of the referenced application. Based on the above discussion, it complies with the approval criteria listed in K.A.R. 5-3-11, and minimum well spacing requirements, it is recommended that the referencednew application be approved.

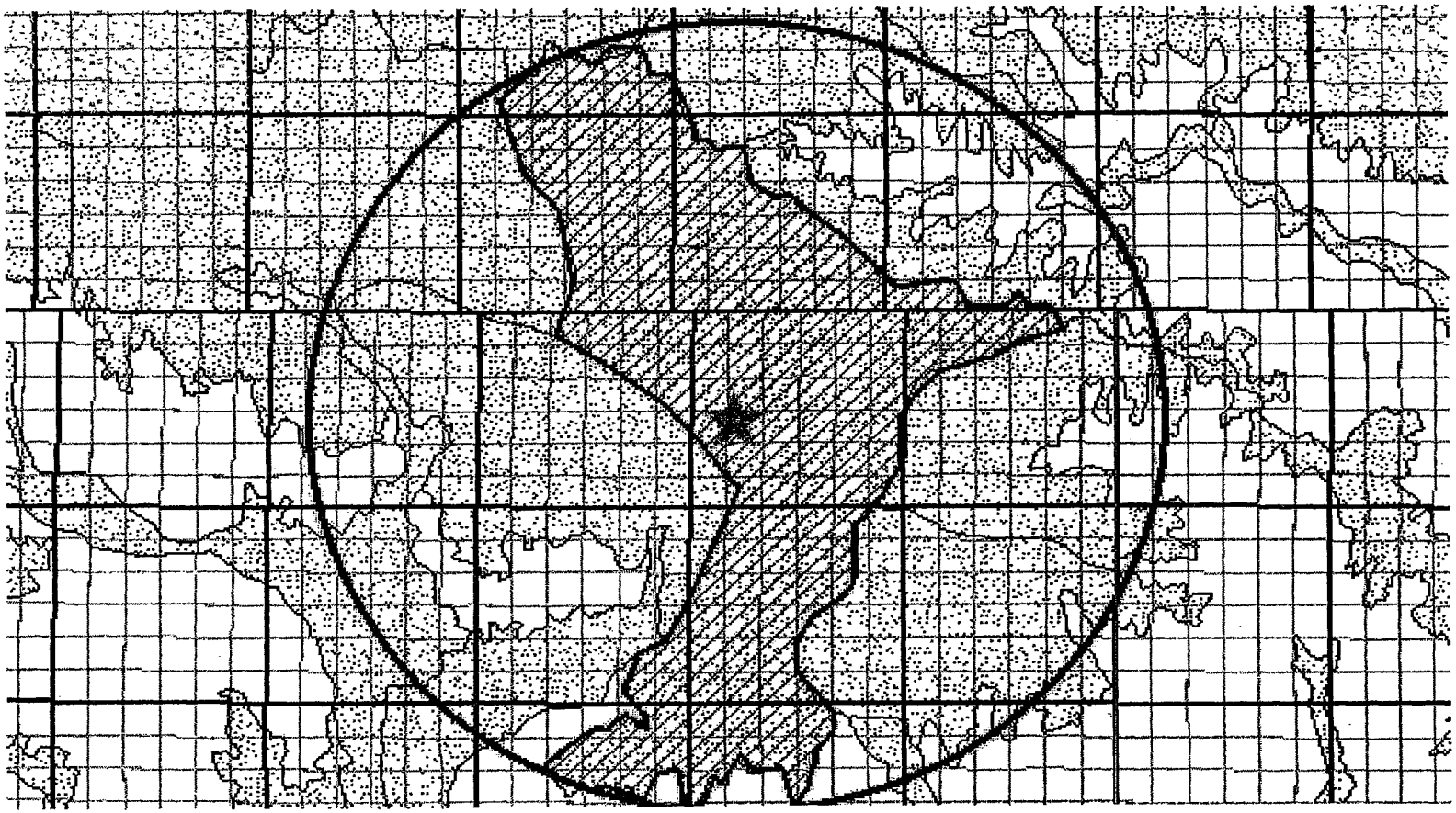
Doug Schemm

Doug Schemm
Environmental Scientist
Permits Unit

29-39

29-40

Safe Yield Report Sheet
Proposed Water Right Application
Point of Diversion in SESENWNW 20-31S-18W



29-41

Analysis Results

4,877 (per K.A.R 5-3-11)

The selected PD is in an area RESTRICTED to new appropriations.
The safe yield, based on the variables listed below is ~~4,891.47~~ AF.
Total prior appropriation in the circle is 4,720.63 AF. -195-12.52 = 4,513.11 + Bibb Files 39 + 183 = 4,735.11 AF (Appropriated)
Total quantity of water available for appropriation is 170.84 AF.

Safe Yield Variables

90035

The area used for the analysis is set at ~~90304~~ acres.
Potential annual recharge of the area is estimated to be 1.3 inches.
The percent of recharge available for appropriation is 50%.

4,877
-4,735.11
142 AF Available

Authorized Quantity values are as of 17-DEC-2009 and are based on Appropriated and Vested ground water right and possible stream nodes for GMD #2. Domestic, Term and Temporary water rights have been excluded.

There are 29 water right(s) and 29 point(s) of diversion within the circle.

File	Number	Use	ST	SR	Q4	Q3	Q2	Q1	FeetN	FeetW	Sec	Twp	Rng	ID	Qind	Auth_Quant	Add_Quant	Tacres	Nacres
A	4051 00	MUN	NK	G		SE	SE	SW	0	0	07	32	18W	1	WR	39.00	0.00		
A	16557 00	IRR	NK	G			NC	NW	3960	3935	32	31	18W	1	WR	238.00	238.00	160.00	160.00
A	19153 00	IRR	NK	G			NC	SW	1305	3950	32	31	18W	2	WR	95.00	95.00	160.00	160.00
A	20033 00	MUN	NK	G		SW	SW	NW	2776	5247	17	32	18W	1	WR	39.23	39.23		
A	21284 00	IRR	NK	G			NC	NW	3890	3985	17	32	18W	2	WR	192.00	192.00	158.00	158.00
A	21583 00	IRR	NK	G		NC	W2	SW	1520	4575	27	31	18W	1	WR	177.00	177.00	126.00	126.00
A	21749 00	IRR	NK	G			NC	SE	1400	1365	19	31	18W	1	WR	194.00	194.00	160.00	160.00
A	22299 00	IRR	NK	G		NW	SE	NW	3860	3870	04	32	18W	1	WR	172.50	172.50	120.00	120.00
A	22523 00	IRR	NK	G					1355	3945	21	31	18W	1	WR	195.00	195.00	160.00	160.00
A	22644 00	MUN	NK	G		SW	SW	NW	2776	5247	17	32	18W	1	WR	103.61	64.38		
Same		MUN	NK	G		SW	SW	NW	2713	5222	17	32	18W	3	WR				
A	22734 00	IRR	NK	G			NC	NE	4000	1340	30	31	18W	2	WR	195.00	195.00	130.00	130.00
A	24019 00	IRR	NK	G			NC	SW	1320	3960	29	31	18W	1	WR	195.00	195.00	132.00	132.00
A	26324 00	IRR	NK	G					1310	2672	25	31	18W	1	WR	119.00	119.00	160.00	160.00
A	26389 00	IRR	NK	G			NC	SE	1330	1315	35	31	18W	1	WR	195.00	195.00	160.00	160.00
A	26390 00	IRR	NK	G		NC	N2	NW	4610	3975	35	31	18W	2	WR	195.00	195.00	160.00	160.00
A	26391 00	IRR	NK	G			NC	SW	1305	3995	35	31	18W	3	WR	195.00	195.00	160.00	160.00
A	26392 00	IRR	NK	G			NC	SW	1331	3945	26	31	18W	1	WR	195.00	195.00	160.00	160.00
A	26673 00	IRR	NK	G			NC	N2	3950	2670	34	31	18W	1	WR	166.00	166.00	140.00	140.00
A	26718 00	IRR	NK	G			NC	SE	1340	1320	03	32	18W	1	WR	198.00	198.00	160.00	160.00
A	26719 00	IRR	NK	G			NC	SW	1350	3940	03	32	18W	2	WR	198.00	198.00	160.00	160.00

89-42

A	26720	00	IRR	NK	G		NC	NW	3970	3965	03	32	18W	3	WR	198.00	198.00	159.69	159.79
A	26721	00	IRR	NK	G		NC	NE	3955	1340	03	32	18W	4	WR	198.00	198.00	160.41	160.41
A	26780	00	IRR	NK	G		NC	NW	3990	3950	05	32	18W	1	WR	198.00	198.00	154.00	154.00
A	27092	00	IRR	NK	G		NC	NE	3950	1352	35	31	18W	4	WR	195.00	195.00	136.00	136.00
A	31904	00	IRR	NK	G		CW	SE	1320	2500	34	31	18W	3	WR	167.00	167.00	140.00	140.00
A	33198	00	IRR	NK	G	NW	SE	SE	980	1320	17	32	18W	4	WR	177.00	177.00	132.00	132.00
A	40319	00	IRR	NK	G		NC	NE	4024	1445	34	30	19W	1	WR	162.00	162.00	130.00	130.00
A	45005	00	IRR	AY	G	SE	NW	NW	3980	3980	12	31	18W	1	WR	~~195.00~~	~~195.00~~	130.00	130.00
A	46765	00	IND	KE	G	SW	SW	SW	440	5200	05	30	18W	1	WR	~~12.52~~	~~12.52~~		

40,700 = 39 AF

40,701 = 183 AF

2-mile circle safe yield 29-43

Safe Yield Report Sheet.
Water Right Number, 45005-00, With A 2 Mile Buffer.
Point of Diversion located in 12-31S-18W 1.

Analysis Results

The selected PD is in an area with RESTRICTIONS to new appropriations.
The safe yield, based on the variables listed below, is 435.63 AF.
Total prior appropriations in the circle is 195.00 AF.
Total quantity of water available for appropriation is 240.63 AF.

Safe Yield Variables

The area used for the analysis is set at 8042 acres.
The potential annual recharge of the area is estimated to be 1.3 inches.
The percent of calculated recharge available for appropriation is 50 %.

Authorized Quantity values are as of 12/17/2009 and are based on Appropriated and Vested ground water rights and possible stream nodes for GMDs. Domestic, Term and Temporary water rights have been excluded.

There are 1 water right(s) and 1 point(s) of diversion within the circle.

File Number	Use	ST	SR	Q4	Q3	Q2	Q1	FeetN	FeetW	Sec	Twp	Rng	ID	Qind	Auth_Quant	Add_Quant	Tacres	Nacres
A 45005 00	IRR	AY	G		SE	NW	NW	3980.	3980	12	31	18W	1	WR	195.00	195.00	130:00	130.00

WATER MANAGEMENT FOR THE SOUTHWEST
GMD3

Southwest Kansas
Groundwater Management District No. 3
409 Campus Drive, Suite 108
Garden City, Kansas 67846-6158
(620) 275-7147 phone (620) 275-1431 fax
www.gmd3.org

March 13, 2009

Doug Schemm
Kansas Department of Agriculture
Division of Water Resources
109 SW 9th St., 2nd Floor
Topeka, Kansas 66612-1283

RE: New Application
File No. 46891A

Dear Doug:

We have completed a review of the above referenced new application. The applicant is requesting 750 acre feet for industrial use with a new appropriation. In accordance with K.A.R. 5-23-4, this area can not have more than 75% of the safe yield budget appropriated, which means 717.12 acre feet is the maximum that can be appropriated. Our review shows that Water Appropriation, File No. 45,722 accounts for 21.5 acre feet of that safe yield budget. Therefore the maximum quantity left for this application is 516.34 acre feet. Spacing is met in accordance with K.A.R. 5-23-3. It is therefore recommended that the application be approved with a quantity not to exceed 516.34 acre feet. *

Thank you for the opportunity to review the applications and to provide a recommendation. If you have any questions, please don't hesitate to contact us.

Sincerely,

Mark E. Rude
Executive Director

MR/JN/jn

* Error in calculation- there are no other wells within 2-mile circle, and safe yield determination was incorrect. (See attached memo from Mike Meyer). Safe yield should be 522.76 A.F. DWS/DWR

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MAR 19 2009
KS DEPT OF AGRICULTURE

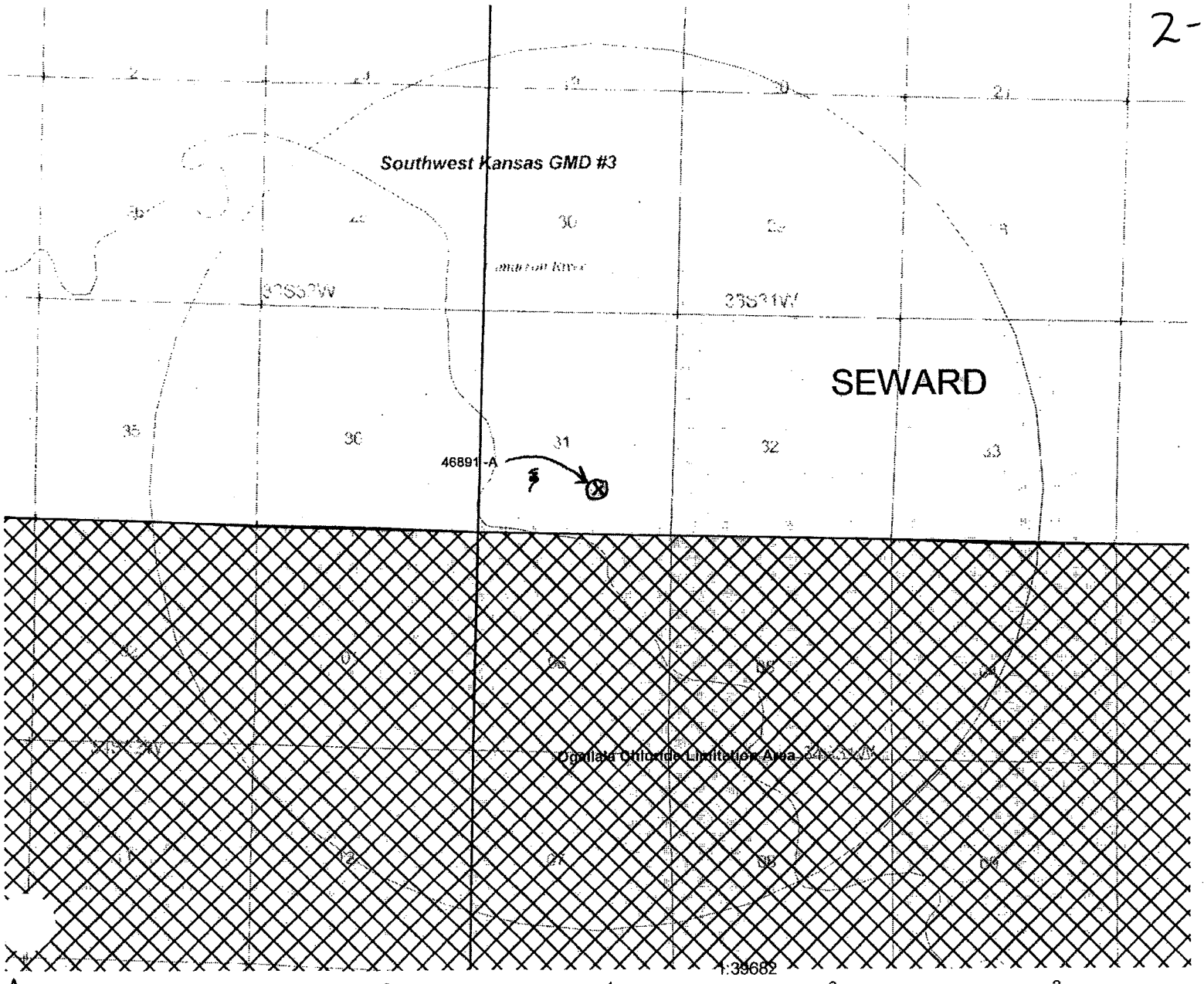
29-44

SCANNED

Proposed Pd In 31-33s-31w (1128n,1789w) With A 2 Mile Buffer

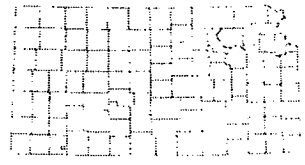
No other wells in 2-mile circle.

29-45



Section Corners
PLSS
PD
Ground Water
Subbasins
Hydrology
Special Areas
Closed
Restricted
Townships
Cities
Towns
Lakes
County
GMD

Index Map



This map was created by WIMAS on Dec 24, 2008 and represents water right conditions as of 12/24/2008.

Entire 2-mile circle

29-40

Safe Yield Report Sheet.
Proposed Pd In 31-33s-31w (1128n,1789w) With A 2 Mile Buffer.

Analysis Results

The selected PD is in an area OPEN to new appropriations.
The safe yield, based on the variables listed below, is 522.76 AF.
Total prior appropriations in the circle is 750.00 AF.
Total quantity of water available for appropriation is 0.00 AF.

Safe Yield Variables

The area used for the analysis is set at 8042 acres.
The potential annual recharge of the area is estimated to be 1.04 inches.
The percent of calculated recharge available for appropriation is 75 %.

Authorized Quantity values are as of 12/24/2008 and are based on Appropriated and Vested ground water rights and possible stream nodes for GMDs. Domestic, Term and Temporary water rights have been excluded.

There are 1 water right(s) and 1 point(s) of diversion within the circle.

File Number	Use	ST	SR	Q4	Q3	Q2	Q1	FeetN	FeetW	Sec	Twp	Rng	ID	Qind	Auth Quant	Add Quant	Tacres	Nacres
A 46891	A	MUN	AY	G			W2	SE	1320	3300	31	33	31W	1	WR	750.00	750.00	0.00	0.00

Schemm, Doug

From: Meyer, Mike
Sent: Monday, March 23, 2009 9:21 AM
To: Schemm, Doug
Subject: RE: Arkalon Energy 46,891A

Doug, the GMD#3 recommendation is not correct. They referenced a nearby well File No. 45722 which is not within 2 miles of the proposed point of diversion (45722 is not even authorized for 21.5 AF). According to the information I have there are no wells within a 2 Mile radius. Therefore, they should be able to appropriate the entire safe yield amount. I would like you to run a safe yield calculation it double check the amount available. When I ran this initially I came up with 522.76 AF, and the GMD#3 with the correction to their letter by not including the nearby well, should be 537.84 AF. Their letter is also misleading as it states that 717.12 AF is the maximum available after the 75%, which may be worded wrong.

I have spoke to Jason at the GMD#3, he agrees that there is no wells within 2 miles of the proposed point of diversion, and that if you need anything from them, they can modify their letter or just make it a matter of record in our records. They had an error on their tool they use to calculate safe yield.

Please make corrections, and let me know what the real quantity is that can be appropriated by this file.

thanks

29-47

GMD 4
Full 2-mile
Circle -
Ogallala Aquifer
meets safe yield

29-48

e Yield Report Sheet.
water Right Number, 47475-00, With A 2 Mile Buffer.
Point of Diversion located in 9-8S-35W 1.

Analysis Results

The selected PD is in an area OPEN to new appropriations.
The safe yield, based on the variables listed below, is 251.33 AF.
Total prior appropriations in the circle is 244.50 AF.
Total quantity of water available for appropriation is 6.83 AF.

Safe Yield Variables

The area used for the analysis is set at 8042 acres.
The potential annual recharge of the area is estimated to be 0.5 inches.
The percent of calculated recharge available for appropriation is 75 %.

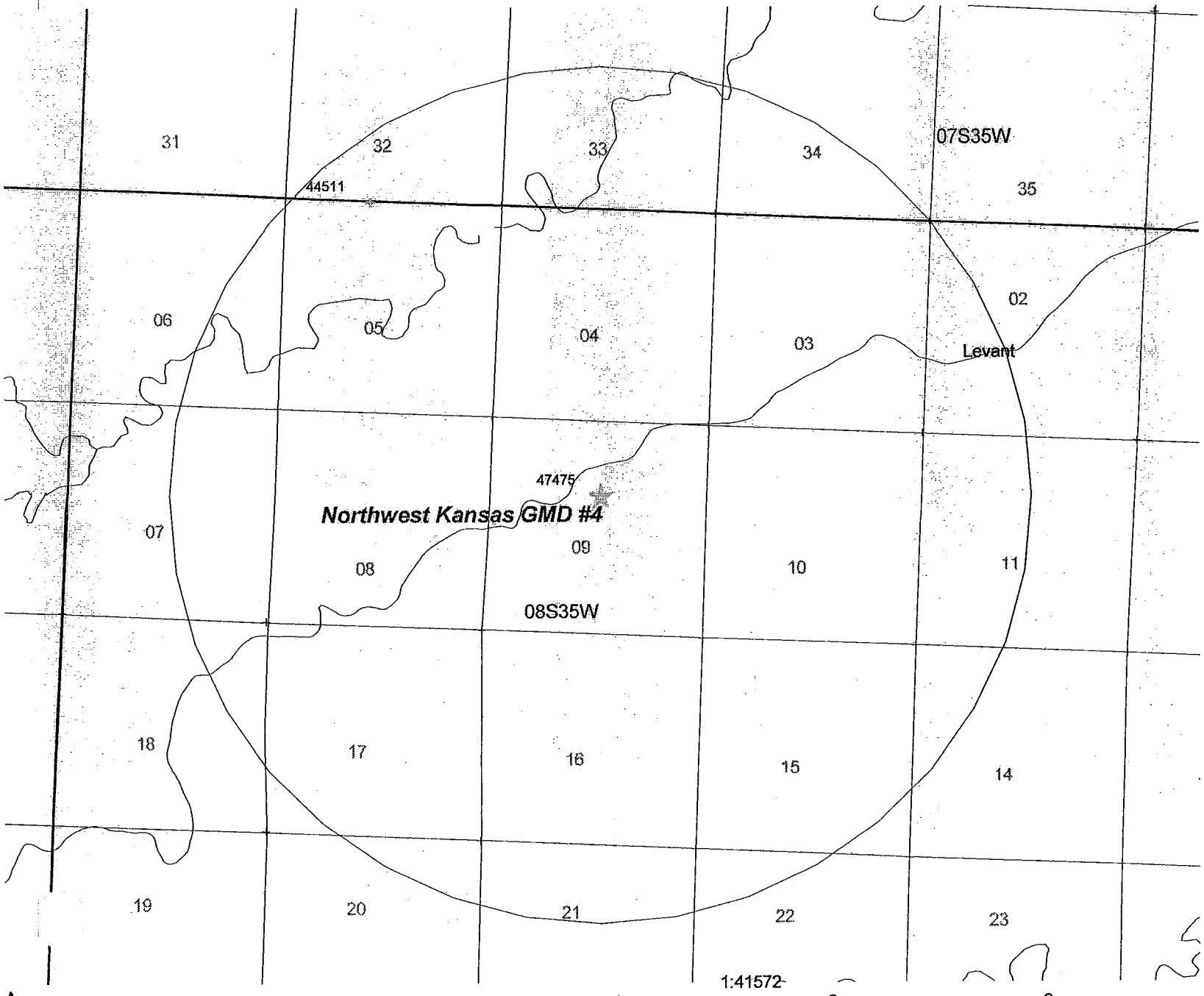
Authorized Quantity values are as of 09/25/2010 and are based on Appropriated and Vested ground water rights and possible stream nodes for GMDs. Domestic, Term and Temporary water rights have been excluded.

There are 2 water right(s) and 2 point(s) of diversion within the circle.

File Number	Use	ST	SR	Q4	Q3	Q2	Q1	FeetN	FeetW	Sec	Twp	Rng	ID	Qind	Auth_Quant	Add_Quant	Tacres	Nacres
A 44511 00	IRR	LR	G		NE	NE	NW	5230	3230	5	8	35W	2	WR	57.00	57.00	54.00	54.00
A 47475 00	IRR	GY	G		NW	SW	NE	3432	2634	9	8	35W	1	WR	187.50	187.50	125.00	125.00

Water Right Number, 47475-00, With A 2 Mile Buffer

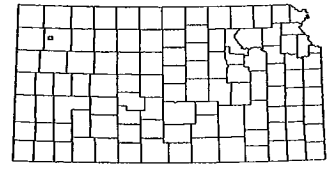
29-49



PD
- Ground Water
- Queried PD(s)
- Subbasins
- Hydrology

Special Areas
- Closed
- Restricted
- PLSS
- Section Corners
- Townships
- Cities
- Towns
- Lakes
- GMD

Index Map



This map was created by WIMAS on Sep 27, 2010 and represents water right conditions as of 09/25/2010.

NORTHWEST KANSAS GROUNDWATER MANAGEMENT DISTRICT NO. 4

Fax: (785) 462-2693
E-mail: wab@gmd4.org
URL: www.gmd4.org

1175 South Range Avenue
P O Box 905
Colby, Kansas 67701-0905
(785) 462-3915

March 8, 2010

Douglas Schemm
Division of Water Resources
109 SW 9th Street
2nd Floor
Topeka KS 66612-1283

RE: Application 47,475
Bellamy Farms

Dear Mr. Schemm

The Northwest Kansas Groundwater Management District has reviewed the above referenced application and based on our records and the information supplied by the applicant, we have determined that the following recommendations be made to the Chief Engineer:

Approve application. Water Conservation and Resource Development Plan enclosed.

If any additional information is required, please contact me.

Sincerely

Ray Luhman
Assistant Manager

pc: Stockton Field Office

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29-50

EPA

Questions and specific information requested from the Kansas Joint Committee on Energy and Environmental Policy.

1. Region 6 response to the Texas Letter

Provided to the KS Legislative Research Department via email on 9/14/10 (see pp 7-9)

2. How are economics taken in to account as they relate to the BACT requirement? Question resulted from Committee concerns and statements about losing jobs in KS, closing plants, losing jobs to other countries since our regulations are so stringent.

In enacting the PSD program, including the Best Available Control Technology (BACT) requirement, Congress established the guiding principle that economic growth should occur in a manner consistent with preservation of clean air. EPA provides guidance to permitting authorities, including states, which implement the federal program, recognizing the direction from Congress.

Permit applicants are initially responsible for recommending control requirements to the permitting authority. A permit applicant should conduct a five step process to evaluate Best Available Control Technology (BACT).

Step 1:	Identify all control options
Step 2:	Eliminate technically infeasible options
Step 3:	Rank remaining control options in descending order of control effectiveness
Step 4:	Eliminate control options based on evaluation of collateral (energy, environmental, or **economic**) impacts
Step 5:	Select BACT

Thus, BACT is an achievable emissions rate determined by the permitting authority on a case-by-case basis, which takes into consideration economic factors such as cost effectiveness. Because the BACT analysis is very case-specific, it is difficult to generalize about the weight give to economic factors. However, permit applicants are given the opportunity to recommend permit conditions based on all of the relevant factors.

Ms. Hatch reported in a follow-up email that the list of available BACT for CO_2 and the new ozone NAAQS are anticipated in Oct. 2010, but exact dates are not yet available.

JOINT COMMITTEE ON ENERGY AND ENVIRONMENTAL POLICY
DATE: 10/8/10
ATTACHMENT 30

3. Both the Electric Power and the Cement representatives stated that BACT is not available commercially, we are setting guidelines that industry can't meet because the technology is not available?

See response to #2 above. The BACT process includes a technical feasibility and cost effectiveness analysis. Applicants can assert that a control option identified in Step 1 is technically infeasible based on commercial unavailability. Furthermore, even commercially available technologies may be eliminated based on cost or other factors later in the BACT process.

4. What scientific evidence supports the negative health impacts of GHGs, and even more specific CO2?

Please refer to Section 7 and Section 8 of EPA's endangerment finding's Technical Support Document at: (p 10 →)
http://www.epa.gov/climatechange/endangerment/downloads/Endangerment%20TSD.pdf

5. Concerning new air regulations, what might have the biggest impact in western KS that legislators should be aware of? A big concern is dust on farms?

See answer to #6

6. What are the Particulate Matter (PM) impacts to KS, what is the time-line and what is KDHE required to do as part of the PM changes

Combined Answer to Questions 5 & 6:

EPA sets National Ambient Air Quality Standards (NAAQS) for six principal pollutants, which are called "criteria" pollutants. EPA is required by the Clean Air Act to periodically review these standards. EPA is currently reviewing or has recently completed a review of the NAAQS for several criteria air pollutants such as: Ozone, Particulate Matter, Nitrogen Dioxide, and Sulfur Dioxide. For more information on the NAAQS, see EPA's website at: http://www.epa.gov/ttn/naaqs/.

Current Particulate Matter NAAQS – Currently, all areas of Kansas are designated attainment/unclassifiable for the 2006 PM2.5 NAAQS which are set at 35 ug/m3 for the 24-hour standard and 15 ug/m3 for the annual standard. The most recent monitoring data (2007-2009) shows continuing compliance at the locations that are monitored in the state.

State	County	2007-2009 Annual Design Value ($\mu g/m^3$)	2007-2009 24-hour Design Value ($\mu g/m^3$)
Kansas	Johnson	9.6	21
Kansas	Linn	9.7	21
Kansas	Sedgwick	9.6	23
Kansas	Shawnee	10.0	23
Kansas	Sumner	9.1	21
Kansas	Wyandotte	10.7	22

30-2

New Particulate Matter NAAQS – The PM NAAQS (PM10 and PM2.5) are currently under revision and the Agency's recommendations on what to do with the standard (e.g. retain or revise, establish a secondary standard or don't) are projected to be proposed sometime in early 2011. The Agency utilizes Policy Assessments (the second assessment is currently available at http://www.epa.gov/ttn/naaqs/standards/pm/s_pm_2007_pa.html) to outline staff level recommendations for action on the NAAQS. One of the staff recommendations is to revise the annual PM2.5 standard to 11 ug/m3. Even at this low of a standard, using the most current data, monitors in the state would be monitoring attainment of the standard.

If the staff recommendation to develop a secondary standard for urban visibility is proposed by the Agency it will likely be based on an algorithm tied to PM2.5 monitoring. Since this neither this algorithm nor its application have been compared to data specific to the state (nor has the algorithm been proposed and vetted publically as a NAAQS revision) we can't speculate on impacts to the urban areas of Kansas. There has been some speculation that EPA is planning to regulate dust from farm fields or gravel roads, but, as can be discerned from the Policy Assessments, there is no truth to that allegation. Additional information regarding the status of the PM NAAQS review is available at http://www.epa.gov/ttn/naaqs/standards/pm/s_pm_index.html.

7. When will the new Ozone standard be available?

EPA has delayed the announcement of the new Ozone NAAQS until October of 2010. Additional information on the NAAQS review for the Ozone standard can be found at: http://www.epa.gov/glo/actions.html

8. A representative from the KS Cement Council stated that EPA regulations are directly responsible for the closing of two plants in R7 - one is in Bonner Springs, 2nd location not identified. The representative also stated that EPA's new regulations are likely to close additional plants. He stated that EPA's new regulations are a misguided attempt to use the CAA. Additionally, the mercury and fly ash rules will have serious consequences to Cement industry.

EPA's experience with cement kiln plant closings indicate that these closures have more to do with industry consolidation, corporate mergers, and retirement of old, inefficient kilns, rather than direct reaction to new environmental regulatory requirements. At least over the last 20 years, we are unaware of a cement kiln closing in Bonner Springs, Kansas.

36-3

9. EPA is moving faster than ever with new rules and regulations, what is the hurry, both the cement industry and the electric utilities stated that EPA is moving so quickly that they will not be able to get new controls in place soon enough to meet the timelines.

Many of the recent EPA regulatory actions directly relate to existing mandates within the 1990 Clean Air Act Amendments. Many more are the result of court-ordered deadlines where EPA has no choice but to promulgate a regulation. The CAA also requires periodic reviews of existing standards like National Ambient Air Quality Standards (NAAQS) to ensure the protection of public health in light of the evolving state of science.

10. The Electric Utilities representative stated that the modeling data that EPA used for the Transport rules is flawed, EPA is not considering current emission data that demonstrates lower numbers than the modeling data does?

See answer to #11

11. Senator Lee, in referring to the map of states under the Transport Rule, KS doesn't seem like it should be included on the map?

Combined answers to Questions 10 and 11:

Proposed Transport Rule:
On July 6, 2010, EPA proposed a Rule that would protect the health of millions of Americans by helping states reduce air pollution and attain clean air standards. This rule, known as the Transport Rule would require 31 states and the District of Columbia to significantly improve air quality by reducing power plant emissions that contribute to ozone and fine particle pollution in other states. EPA is taking comment on the rule until October 1, 2010 at Docket ID No. EPA–HQ–OAR–2009–0491. EPA will carefully consider all relevant comments prior to taking final action. The rule is scheduled to be finalized by the summer of 2011.

EPA's Proposed Transport Rule can be found on the EPA's website at the following link: http://www.epa.gov/airquality/transport/index.html

The Technical Support Documents for EPA's Proposed Transport Rule can be found on EPA's website at the following link: http://www.epa.gov/airquality/transport/tech.html

Air Quality Modeling to Support Proposed Rule –
Section IV.C "Air Quality Modeling Approach and Results" of the proposed Transport Rule describes the air quality modeling performed to support the rule (75 FR 45238-45270). PM and Ozone results for Kansas can be found throughout 45261 – 45269 of the Proposed Rule.

30-4

The "Air Quality Modeling" Technical Support Document can be found on EPA's website at the following link:
http://www.epa.gov/airquality/transport/pdfs/TR_AQModeling_TSD.pdf

The Integrated Planning Model (IPM) analysis for the Proposed Transport Rule can be found on EPA's website at the following link:
http://www.epa.gov/airmarkets/progsregs/epa-ipm/transport.html

The Regulatory Impact Analysis for the Proposed Federal Transport Rule can be found on EPA's website at the following link:
http://www.epa.gov/ttn/ecas/regdata/RIAs/proposaltrria_final.pdf

A summary document of "Key areas to comment on the Transport Rule" can be found on EPA's website at the following link:
http://www.epa.gov/airquality/transport/pdfs/TransportRuleSummaryCommentRequest.pdf

12. Sen McGinn – EPA was going to talk with headquarters about the uniqueness of the KS prairie – for exceptional events it appears EPA typically focuses on forests fires and similar events. The burning of the Flint Hills is unique and should be considered as such – what was the result of R7 talking with HQ's?

EPA Region 7 is still in communication with EPA headquarters on this issue. Region 7 has had limited involvement in the development of the draft OAQPS guidance document in support of the Exceptional Events Rule. EPA is still considering how to address agricultural burning. The March 22, 2007 Exceptional Events Rule can be found at the following link: http://epa.gov/ttncaaa1/t1/fr_notices/exeventfr.pdf

13. What are the air quality impacts of the intermodal facility?

Burlington Northern Santa Fe (BNSF) Railway Company has a preferred site for a proposed intermodal facility (IMF) west of Gardner, in Johnson County, Kansas. EPA reviewed the Environmental Assessment for the BNSF IMF and responded to the U.S. Army Corps of Engineers in a letter on December 14, 2009. Based on EPA's review of the documentation, EPA highlighted an area of concern about the project's predicted impacts on air quality with respect to particulate matter (PM) emissions reasonably attributable to the project. To address this issue, BNSF has entered into a two-year "Agreement for Operation of an Ambient Air Monitoring Station at the proposed intermodal facility in Johnson County, Kansas" with the Kansas Department of Health and Environment (KDHE) for PM monitoring, and for implementation of mitigation measures, as necessary based on monitored values. EPA has encouraged KDHE and BNSF to extend the monitoring period beyond the two years specified in the agreement. KDHE and EPA will continue to evaluate air impacts when the facility becomes operational.

30-5

14. If the KC area uses reformulated gasoline during the ozone season why can't they and the other impacted areas use it during the flint hills burning season? Why can cities only use the reformulated gas if they are in non-attainment?

The use of reformulated gasoline (RFG) is not required in Kansas City during the ozone season or otherwise. (Kansas and Missouri have requirements in the State Implementation Plans for Kansas City to control volatility of fuels during the high ozone season, but this is not a RFG requirement.) The Clean Air Act, in effect, limits the authority of EPA to regulate fuels (for example, EPA can only require reformulated gasoline in certain nonattainment areas, and only nonattainment areas can opt in to the program.) The Act also generally preempts state and local governments from imposing additional fuel controls unless, for example, there are no other feasible and reasonable controls (controls on non-fuel emissions) to timely achieve air quality standards in an area.

30-6

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

AUG 30 2010

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

Mr. Jon Niermann
Assistant Attorney General
State of Texas
Post Office Box 12548
Austin, Texas 78711-2548

Dear Mr. Niermann:

Thank you for your letter of August 19, 2010, in which you requested that the U.S. Environmental Protection Agency (EPA) stay the implementation of the Prevention of Significant Deterioration (PSD) and Title V Greenhouse Gas Tailoring Rule ("Tailoring Rule") pending resolution of the State of Texas' petition for review of the rule in the United States Court of Appeals for the District of Columbia Circuit.

We are reviewing your letter. Please be assured that we are considering the information you provide in the letter carefully before responding. We will notify you and the public of our final decision on the petition once it is made.

I appreciate the opportunity to be of service and trust that the information provided is helpful to you.

Sincerely,

Stephen D. Page
Director
Office of Air Quality Planning
and Standards

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
AIR AND RADIATION

Mr. J. Reed Clay, Jr.
Special Assistant and Senior Counsel to the Attorney General
State of Texas
Post Office Box 12548
Austin, Texas 78711-2548

Dear Mr. Clay:

Thank you for your letter of August 30, 2010, to the U.S. Environmental Protection Agency's (EPA) Administrator Lisa Jackson in which you request that the EPA respond to the State of Texas' August 2 and August 19 letters related to the Prevention of Significant Deterioration (PSD) and Title V Greenhouse Gas Tailoring Rule ("Tailoring Rule"). In your letter, you state that Texas will seek relief from the United States Court of Appeals for the District of Columbia Circuit if EPA either denies its request to stay the Tailoring Rule or fails to respond to your letter by September 7, 2010.

Please note that EPA has responded to the two letters you reference in your letter. On August 27, 2010, Al Almendariz, Regional Administrator for EPA Region 6, responded to the State of Texas' August 2 letter (response enclosed) and on August 30, 2010, Stephen D. Page, Director of the Office of Air Quality Planning and Standards responded to the August 19 letter (response enclosed). As stated in the previous responses, we are carefully considering the information the State of Texas provided in the letters before making any final decision. We will notify you and the public of our final decision once it is made.

Again, thank you for your letter. I appreciate the opportunity to be of service and trust the information provided is helpful.

Sincerely,

Gina McCarthy
Assistant Administrator

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

AUG 2 7 2010

Bryan W. Shaw, Ph.D.
Chairman
Texas Commission on Environmental Quality
Post Office Box 13087
Austin, Texas 78711-3087

The Honorable Gregg Abbott
Attorney General of Texas
Post Office Box 12548
Austin, Texas 78711-2548

Dear Chairman Shaw and Attorney General Abbott:

Thank you for your letter dated August 2, 2010, responding to the U.S. Environmental Protection Agency's (EPA) request that states submit information to the appropriate EPA Regional Administrator regarding their authority to issue Prevention of Significant Deterioration (PSD) or Title V permits for Greenhouse Gas (GHG) emissions sources consistent with EPA's final rulemaking titled "Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule." We appreciate your timely and detailed response to our request.

Taking into consideration the responses from all states, Administrator Lisa P. Jackson signed two proposed rulemakings on August 12, 2010. The first proposal outlines a proposed State Implementation Plan (SIP) call for those state agencies that do not appear to have authority or who have asserted to EPA that they do not have the authority under State law or their PSD permitting rules to permit GHG emissions. The second proposal outlines a proposed Federal Implementation Plan (FIP) which would be applied to any permitting authority that cannot or does not appear to be able to apply its PSD permitting program to sources of GHGs. Details of our August 12 action and copies of the signed Federal Register notices may be found at http://www.epa.gov/nsr. In addition, please be aware that within 30 days from the date of these two proposed rulemakings being published in the Federal Register, we are requesting that the Texas Commission on Environmental Quality (TCEQ) submit a letter to EPA that explains the status of any GHG permitting authority and documents why the TCEQ program cannot regulate GHG emissions.

If you have further questions about our current proposed rulemaking actions or the GHG Tailoring Rule, please contact me at (214) 665-2100, or your staff may contact Mr. Jeff Robinson of my staff at (214) 665-6435.

Sincerely yours,

Al Armendariz
Regional Administrator

Section 7

Human Health

Warm temperatures and extreme weather already cause and contribute to adverse human health outcomes through heat-related mortality and morbidity, storm-related fatalities and injuries, and disease. In the absence of effective adaptation, these effects are likely to increase with climate change. Depending on progress in health care and access, infrastructure, and technology, climate change could increase the risk of heat wave deaths, respiratory illness through exposure to aeroallergens and ozone (discussed in Section 8), and certain diseases (CCSP, 2008b; Confalonieri et al, 2007). Studies in temperate areas (which would include large portions of the United States) have shown that climate change is projected to bring some benefits, such as fewer deaths from cold exposure. The balance of positive and negative health impacts as a result of climate change will vary from one location to another and will alter over time as climate change continues (CCSP, 2008b).

In its *Third Assessment Report*, the IPCC produced a number of key findings summarizing the likely climate change health effects in North America. These effects, which were reaffirmed in the IPCC *Fourth Assessment Report* (Field et al., 2007), include:

- Increased deaths, injuries, infectious diseases, and stress-related disorders and other adverse effects associated with social disruption and migration from more frequent extreme weather.
- Increased frequency and severity of heat waves leading to more illness and death, particularly among the young, elderly, and frail.
- Expanded ranges of vector-borne and tick-borne diseases in North America but with moderating influence by public health measures and other factors.

The more recent CCSP (2008b) report on human health stated as one of its conclusions: "The United States is certainly capable of adapting to the collective impacts of climate change. However, there will still be certain individuals and locations where the adaptive capacity is less and these individuals and their communities will be disproportionally impacted by climate change."

There are few studies that address the interactive effects of multiple climate change impacts or of interactions between climate change health impacts and other kinds of local, regional, and global socio-economic changes (Field et al., 2007). For example, climate change impacts on human health in urban areas will be compounded by aging infrastructure, maladapted urban form and building stock, urban heat islands, air pollution, population growth, and an aging population (Field et al., 2007).

Vulnerability is the summation of all the factors of risk and resilience that determine whether individuals experience adverse health impacts. Specific subpopulations may experience heightened vulnerability for climate-related health effects. Climate change is very likely to accentuate the disparities already evident in the American health care systems, as many of the expected health effects are likely to fall disproportionately on the poor, the elderly, the disabled, and the uninsured (Ebi et al., 2008).

The IPCC concludes that human health risks from climate change will be strongly modulated by changes in health care, infrastructure, technology, and accessibility to health care (Field et al., 2007). The aging of the population and patterns of immigration and/or emigration will also strongly influence risks (Field et al., 2007).

This section describes the literature on the impacts of climate change on human health in four areas: temperature effects, extreme events, climate sensitive diseases, and aeroallergens. The health impacts resulting from climate change effects on air quality are discussed in Section 8.

7(a) Temperature Effects

According to the IPCC (2007d), it is very likely[50] that there were warmer and fewer cold days and nights and warmer and more frequent hot days over most land areas during the late 20th century (see Section 4(b)). It is virtually certain that these trends will continue during the 21st century (see Section 6(b)). As a result of the projected warming, the IPCC projects increases in heat-related mortality and morbidity globally (IPCC, 2007b). The projected warming is also expected to result in fewer cold-related deaths. It is not clear whether reduced mortality from cold will be greater or less than increased heat-related mortality in the United States due to climate change (Gamble et al., 2008). Local factors, such as climate, topography, heat-island magnitude, demographic and health characteristics of the population, and policies that affect the social and economic structures of communities, including urban design, energy policy, water use and transportation planning are important in determining the underlying temperature-mortality relationship in a population (Confalonieri et al, 2007; Ebi et al., 2008).

Increased heat exposure

Extreme heat is associated with marked short-term increases in mortality (Confalonieri et al, 2007). Hot temperatures have also been associated with increased morbidity. A study cited in Field et al. (2007) indicates increased hospital admissions for cardiovascular disease and emergency room visits have been documented in parts of North America during heat events. The populations most vulnerable to hot temperatures are older adults, the chronically sick, the very young, city-dwellers, those taking medications that disrupt thermoregulation, the mentally ill, those lacking access to air conditioning, those working or playing outdoors, and the socially isolated (Ebi et al., 2008; IPCC, 2007b).

Exposure to heat is already the leading cause of weather-related deaths in the United States and more than 3,400 deaths between 1999 and 2003 were reported as resulting from exposure to extreme heat (Karl et al., 2009). The Centers for Disease Control and Prevention (CDC, 2006) indicate heat-related deaths can be difficult to identify when illness onset or death is not witnessed by a clinician and that the criteria used to determine heat-related causes of death vary among states. This can lead to underreporting of heat-related deaths or to reporting heat as a factor contributing to death rather than the underlying cause.

The excess mortality during the extreme heat wave in Europe in 2003 demonstrates the lethality of such events, which led to approximately 15,000 deaths in France alone (Confalonieri et al., 2007). Karl et al. (2009) report that an analysis of the European summer heat wave of 2003 found that the risk of such a heat wave is now roughly four times greater than it would have been in the absence of human-induced climate change.

Given projections for climate warming, heat-related morbidity and mortality are projected to increase globally (including in the United States) with climate warming (Confalonieri et al, 2007; Karl et al., 2009). Heat exposures vary widely, and current studies do not quantify the years of life lost due to high temperatures. Estimates of heat-related mortality attributable on extreme heat days are reduced but not eliminated when assumptions about acclimatization and adaptation are included in models. Confalionieri et al. (2007) cite a series of studies that suggests populations in the United States became less sensitive to high temperatures over the period 1964–1998, in part, due to these factors. However, Ebi et al. (2008)

[50] According to IPCC terminology, "very likely" conveys a 90 to 99% probability of occurrence. See Box 1.2 for a full description of IPCC's uncertainty terms.

suggest these results do not imply future increases in heat-related mortality may not occur in the United States, because the percentage of the population with access to air conditioning is high in most regions (thus with limited possibilities for increasing access). In fact, Karl et al. (2009) note air-conditioning is reaching near saturation and report that a recent study shows that the general decline in heat-related deaths that had been observed since the 1970s leveled off in the mid-1990s.

Growing numbers of older adults will increase the size of the population at risk because of a decreased ability to thermoregulate that is a normal part of the aging process (Confalonieri et al, 2007). In addition, according to a study in Confalonieri et al. (2007), almost all the population growth in the next 50 years is expected to occur in cities where temperatures tend to be higher due to the urban heat island[51] effect, increasing the total number of people at risk of adverse health outcomes from extreme heat conditions. In other words, non-climatic factors related to demographics will have a significant influence on future heat-related mortality.

Across North America, the population over the age of 65—those most at-risk of dying from heat waves—will increase slowly to 2010, and then grow dramatically as the Baby Boomers age (Field et al., 2007). Field et al. (2007) also find that severe heat waves are projected to intensify in magnitude and duration over the portions of the United States where these events already occur (high confidence). The IPCC documents the following U.S. regional scenario projections of increases in heat and/or heat-related effects (Confalonieri et al, 2007; Field et al., 2007):

- By the 2080s, in Los Angeles, the number of heat wave days (at or above 90°F [32 °C]) increases four-fold under the B1 emissions scenario (low growth) and six- to eight-fold under A1FI emissions scenario (high growth). Annual number of heat-related deaths in Los Angeles increases from about 165 in the 1990s to 319 to 1,182 for a range of emissions scenarios.
- Chicago is projected to experience 25% more frequent heat waves annually by the period spanning 2080–2099 for a business-as-usual (A1B) emissions scenario.

Additional projections for changes in extreme heat in the U.S. can be found in Section 15 on United States regional climate impacts.

Reduced Cold Exposure

Cold waves continue to pose health risks in northern latitudes in temperature regions where very low temperatures can be reached in a few hours and extend over long periods (Confalonieri et al, 2007). Accidental cold exposure occurs mainly outdoors, among socially deprived people (e.g., alcoholics, the homeless), workers, and the elderly in temperate and cold climates, but cold waves also affect health in warmer climates (Confalonieri et al, 2007). Living in cold environments in polar regions is associated with a range of chronic conditions in the non-indigenous population with acute risk from frostbite and hypothermia (Confalonieri et al, 2007). In countries with populations well-adapted to cold conditions, cold waves can still cause substantial increases in mortality if electricity or heating systems fail (Confalonieri et al, 2007).

Ebi et al. (2008) cite a study reporting that from 1979 to 2002, an average of 689 reported deaths per year (range 417 to 1,021) in the United States, totaling 16,555 over the period, were attributed to exposure to excessive cold temperatures on death certificates. The cold during these events also contributes to deaths caused by respiratory and cardiovascular diseases, so the overall mortality burden is likely underestimated (Ebi et al., 2008).

[51] A heat island refers to urban air and surface temperatures that are higher than nearby rural areas. Many U.S. cities and suburbs have air temperatures up to 10°F (5.6°C) warmer than the surrounding natural land cover.

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The IPCC projects reduced human mortality from cold exposure through 2100 (Confalonieri et al, 2007). Projections of cold-related deaths, and the potential for decreasing their numbers due to warmer winters, can be overestimated unless they take into account the effects of season and influenza, which is not strongly associated with monthly winter temperature (Ebi et al., 2008; Confalonieri et al, 2007). Ebi et al. (2008) report many factors contribute to winter mortality, making the question of how climate change could affect mortality highly uncertain. They report no projections have been published for the United States that incorporate critical factors such as the influence of influenza outbreaks.

Aggregated Changes in Heat and Cold Exposure

The IPCC (2007a) does not explicitly assess studies since the *Third Assessment Report*, which analyzes changes in *both* heat- and cold-related mortality in the United States in the observed climate or for different future climate scenarios. Given the paucity of recent literature on the subject and the challenges in estimating and projecting weather-related mortality, IPCC concludes additional research is needed to understand how the balance of heat- and cold-related deaths might change globally under different climate scenarios (Confalonieri et al, 2007). Similarly, Ebi et al. (2008) find net changes in mortality are difficult to estimate.

The most recent USGCRP assessment (Karl et al., 2009) refers to a study that analyzed daily mortality and weather data in 50 U.S. cities from 1989 to 2000 and found that, on average, cold snaps in the United States increased death rates by 1.6%, while heat waves triggered a 5.7% increase in death rates. The study concludes that increases in heat-related mortality due to global warming are unlikely to be compensated for by decreases in cold-related mortality.

7(b) Extreme Events

In addition to the direct effects of temperature on heat- and cold-related mortality, projected trends in climate change-related exposures of importance to human health will increase the number of people (globally, including in the United States) suffering from disease and injury due to floods, storms, droughts, and fires (high confidence) (Confalonieri et al, 2007). Vulnerability to weather disasters depends on the attributes of the people at risk (including where they live, age, income, education, and disability) and on broader social and environmental factors (level of disaster preparedness, health sector responses, and environmental degradation) (Ebi et al., 2008).

Floods and Storms

The IPCC projects a very likely increase in heavy precipitation event frequency over most areas as described in Section 6(b) and Section 6(c). Increases in the frequency of heavy precipitation events are associated with increased risk of deaths and injuries as well as infectious, respiratory and skin diseases (IPCC, 2007b). Floods are low-probability, high-impact events that can overwhelm physical infrastructure, human resilience, and social organization (Confalonieri et al, 2007). Flood health impacts include deaths, injuries, infectious diseases, intoxications, and mental health problems (Confalonieri et al, 2007). Karl et al. (2009) indicate flooding rains can increase incidence of waterborne diseases due to pathogens such as *Cryptosporidium* and *Giardia*. Flooding may also lead to contamination of waters with dangerous chemicals, heavy metals, or other hazardous substances from storage or from chemicals already in the environment (Confalonieri et al, 2007). In addition, heavy downpours can trigger sewage overflows, contaminating drinking water (Karl et al., 2009)

The IPCC (2007d) also projects likely increases in intense tropical cyclone activity as described in Section 6(b). Increases in tropical cyclone intensity are linked to increases in the risk of deaths, injuries,

waterborne and foodborne diseases, as well as post-traumatic stress disorders (IPCC, 2007b). Drowning by storm surge, heightened by rising sea levels and more intense storms (as projected by IPCC), is the major killer in coastal storms where there are large numbers of deaths (Confalonieri et al, 2007). High-density populations in low-lying coastal regions such as the U.S. Gulf of Mexico experience a high health burden from weather disasters, particularly among lower income groups. In 2005, Hurricane Katrina claimed more than 1,800 lives in the vicinity of the low-lying United States. Gulf Coast and lower income groups were disproportionately affected (Graumann et al., 2005; Nicholls et al., 2007; Confalonieri et al., 2007). While Katrina was a Category 3 hurricane, and its path was forecast well in advance, there was a secondary failure of the levee system. This illustrates that multiple factors contribute to making a disaster and that adaptation measures may not fully avert adverse consequences (Ebi et al., 2008). Additional information about U.S. vulnerability to the potential for more intense tropical cyclones can be found in Section 12(b).

Droughts

Areas affected by droughts are likely to increase according to the IPCC (2007d) as noted in Section 6(e). The health impacts associated with drought tend to most affect semi-arid and arid regions, poor areas and populations, and areas with human-induced water scarcity; hence, many of these effects are likely to be experienced in developing countries and not directly in the United States. Information about the effects of increasing drought on U.S. agriculture can be found in Section 9(c).

Wildfires

In some regions, changes in the mean and variability of temperature and precipitation are projected to increase the size and severity of fire events, including in parts of the United States (Easterling et al., 2007). Wildfires can increase eye and respiratory illnesses and injuries, including burns and smoke inhalation (Ebi et al., 2008). A study cited in Confalonieri et al. (2007) indicates large fires are also accompanied by an increased number of patients seeking emergency services for inhalation of smoke and ash. The IPCC (Field et al., 2007) noted a number of observed changes in U.S. wildfire size and frequency. Additional information on the effects of forest fires can be found in Sections 8(b) and 10(b).

7(c) Climate-Sensitive Diseases

The IPCC (2007b) notes that many human diseases are sensitive to weather. Similarly Karl et al. (2009) reports that important disease-causing agents commonly transmitted by food, water, or animals are susceptible to changes in replication, survival, persistence, habitat range, and transmission as a result of changing climatic conditions such as increasing temperature, precipitation, and extreme weather events. They conclude some diseases transmitted by food, water, and insects are likely to increase.

The incidence of airborne infectious diseases (e.g., coccidioidomycosis) varies seasonally and annually, due partly to climate variations such as drought, which is projected to increase in the southwestern United States (Field et al., 2007; Karl et al., 2008).

Waterborne disease outbreaks are distinctly seasonal (which suggests potential underlying environmental or weather control), clustered in particular watersheds, and associated with heavy precipitation. IPCC (Confalonieri et al., 2007) reports that the risk of infectious disease following flooding in high-income countries is generally low, although increases in respiratory and diarrheal diseases have been reported after floods. However, CCSP (Peterson et al., 2008) finds that analyses of the United States indicate that the assumption that developed countries have low vulnerability may be premature, citing to studies that "have repeatedly concluded that water and food-borne pathogens (that cause diarrhea) will likely increase with projected increases in regional flooding events, primarily by contamination of main waterways." In

another report, CCSP (2008b) notes that flooding can overwhelm sanitation infrastructure and lead to water-related illnesses. A U.S. study documented that 51% of waterborne disease outbreaks were preceded by precipitation events in the top 10% of occurrences, with 68% of outbreaks preceded by precipitation in the top 20% (Peterson et al., 2008). After hurricanes Katrina and Rita in 2005, contamination of water supplies with fecal bacteria led to many cases of diarrheal illness and some deaths (Ebi et al., 2008; CDC, 2005; Confalonieri et al., 2007).

Foodborne diseases show some relationship with temperature (e.g., increased temperatures have been associated with increased cases of Salmonellosis) (Confalonieri et al, 2007). *Vibrio* spp. infections from shellfish consumption may also be influenced by temperature (Confalonieri et al, 2007). For example, Confalonieri et al. (2007) cited a study documenting a 2004 outbreak of *V. parahaemolyticus* linked to atypically high temperatures in Alaskan coastal waters.

According to the CCSP (2008b) report, for the U.S., it is not anticipated that climate change will lead to loss of life or years of life due to chronic illness or injury from waterborne or foodborne illnesses. However, it notes there will likely be an increase in the spread of several foodborne and waterborne pathogens among susceptible populations depending on the pathogens' survival, persistence, habitat range, and transmission under changing climate and environmental conditions. While the United States has successful programs to protect water quality under the Safe Drinking Water Act and the Clean Water Act, some contamination pathways and routes of exposure do not fall under regulatory programs (e.g., dermal absorption from floodwaters, swimming in lakes and ponds with elevated pathogen levels). The primary climate-related factors that affect these pathogens include temperature, precipitation, extreme weather events, and shifts in ecological regimes. Consistent with the latest understanding of climate change on human health, the impact of climate on foodborne and waterborne pathogens will seldom be the only factor determining the burden of human injuries, illness, and death (CCSP 2008b).

The sensitivity of many zoonotic[52] diseases to climate fluctuations is also highlighted by the IPCC (Field et al., 2007). Saint Louis encephalitis has a tendency to appear during hot, dry La Nina years according to a study cited in Field et al. (2007). Associations between temperature and precipitation and tick-borne Lyme disease are also noted by IPCC (Field et al., 2007). A study cited in Field et al. (2007) found that the northern range limit of *Ixodes scapularis*, the tick that carries Lyme disease, could shift north by 120 mi (200 km) by the 2020s and 620 mi (1,000 km) by the 2080s. According to Ebi et al. (2008), studies suggest that higher minimum temperatures generally were favorable to the potential of expanding tick distributions and greater local abundance of these vectors. However, Ebi et al. (2008) add that: "changing patterns of tick-borne disease in Europe are not consistently related to changing climate (Randolph, 2004a). Climate change is projected to decrease the geographic range of TBE (tick-borne encephalitis) in areas of lower latitude and elevation as transmission expands northward (Randolph and Rogers, 2000)".

A study discussed in Field et al. (2007) linked above-average temperatures in the United States during the summers of 2002–2004 to the greatest transmissions of West Nile virus. Karl et al. (2009) refer to a study that suggests greater risks from West Nile virus may result from increases in the frequency of heatwaves, though the risk will also depend on the effectiveness of mosquito control programs.

Although large portions of the United States may be at potential risk for diseases such as malaria based on the distribution of competent disease vectors, locally acquired cases have been virtually eliminated, in part due to effective public health interventions, including vector and disease control activities. (Ebi et al., 2008; Confalonieri et al, 2007).

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[52]A zoonotic disease is any infectious disease that is able to be transmitted from an animal or nonhuman species to humans. The natural reservoir is a nonhuman reservoir.

7(d) Aeroallergens

Climate change, including changes in CO_2 concentrations, could impact the production, distribution, dispersion and allergenicity of aeroallergens and the growth and distribution of weeds, grasses, and trees that produce them (McMichael. et al., 2001; Confalonieri et al., 2007). These changes in aeroallergens and subsequent human exposures could affect the prevalence and severity of allergy symptoms. However, the scientific literature does not provide definitive data or conclusions on how climate change might impact aeroallergens and subsequently the prevalence of allergenic illnesses in the United States In addition, there are numerous other factors that affect aeroallergen levels and the prevalence of associated allergenic illnesses, such as changes in land use, air pollution, and adaptive responses, many of which are difficult to assess (Ebi et al., 2008).

It has generally been observed that the presence of elevated CO_2 concentrations and temperatures stimulates plants to increase photosynthesis, biomass, water use efficiency, and reproductive effort. The IPCC concluded that pollens are likely to increase with elevated temperature and CO_2 (Field et al., 2007). Laboratory studies cited by Field et al. (2007) stimulated increased ragweed-pollen production by over 50% using a doubling of CO_2. A U.S.-based field study referenced by Field et al. (2007), which used existing temperature/CO_2 concentration differences between urban and rural areas as a proxy for climate change, found that ragweed grew faster, flowered earlier, and produced significantly greater aboveground biomass and ragweed pollen at urban locations than at rural locations.

The IPCC (Confalonieri et al, 2007) noted that climate change has caused an earlier onset of the spring pollen season in North America and that there is limited evidence that the length of the pollen season has increased for some species. However, it is unclear whether the allergenic content of these pollens has changed. The IPCC concluded that introductions of new invasive plant species with high allergenic pollen present important health risks, noting that ragweed (*Ambrosia artemisiifolia*) is spreading in several parts of the world (Confalonieri et al, 2007).

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Section 8

Air Quality

Surface air concentrations of air pollutants are highly sensitive to winds, temperature, humidity, and precipitation (Denman et al., 2007). Climate change can be expected to influence the concentration and distribution of air pollutants through a variety of direct and indirect processes, including the modification of biogenic emissions, the change of chemical reaction rates, wash-out of pollutants by precipitation, and modification of weather patterns that influence pollutant buildup. In summarizing the impact of climate change on ozone and particulate matter (PM), the IPCC (Denman et al., 2007) states that "future climate change may cause significant air quality degradation by changing the dispersion rate of pollutants, the chemical environment for ozone and PM generation and the strength of emissions from the biosphere, fires and dust."

This section describes how climate change may alter ambient concentrations of ozone and PM with associated impacts on public health and welfare in the United States.

8(a) Tropospheric Ozone

According to the IPCC (Denman et al., 2007), climate change is expected to lead to increases in regional ozone pollution in the United States and other countries. Ozone impacts on pubic health and welfare are described in EPA's *Air Quality Criteria Document for Ozone* (U.S. EPA, 2006). Breathing ozone at sufficient concentrations can reduce lung function, thereby aggravating asthma or other respiratory conditions. Ozone exposure at sufficient concentrations has been associated with increases in respiratory infection susceptibility, medicine use by asthmatics, emergency department visits, and hospital admissions. Ozone exposure may contribute to premature death, especially in susceptible populations. In contrast to human health effects, which are associated with short-term exposures, the most significant ozone-induced plant effects (e.g., biomass loss, yield reductions) result from the accumulation of ozone exposures over the growing season, with differentially greater impact resulting from exposures to higher concentrations and/or longer durations.

Tropospheric ozone is both naturally occurring and, as the primary constituent of urban smog, a secondary pollutant formed through photochemical reactions involving nitrogen oxides (NO_x) and volatile organic compounds (VOCs) in the presence of sunlight. As described below, climate change can affect ozone by modifying 1) emissions of precursors, 2) atmospheric chemistry, and 3) transport and removal (Denman et al., 2007). There is now consistent evidence from models and observations that 21st century climate change will worsen summertime surface ozone in polluted regions of North America compared to a future with no climate change (Jacob and Winner, 2009).

The IPCC (Denman et al., 2007) states that, for all world regions, "climate change affects the sources of ozone precursors through physical response (lightning), biological response (soils, vegetation, and biomass burning) and human response (energy generation, land use, and agriculture)." NO_x emissions due to lightning are expected to increase in a warmer climate (Denman et al., 2007). Additionally, studies using general circulation models (GCM) concur that influx of ozone from the stratosphere to the troposphere could increase due to large-scale atmospheric circulation shifts (i.e., the Brewer-Dobson circulation) in response to climate warming (Denman et al., 2007). The sensitivity of microbial activity in soils to temperature also points toward a substantial increase in the nitric oxide emissions (Brasseur et al., 2006). As described below, biogenic VOC emissions increase with increasing temperature.

Climate-induced changes of biogenic VOC emissions alone may be regionally substantial and cause significant increases in ozone concentrations (Hauglustaine et al., 2005; Hogrefe et al., 2004; European Commission, 2003). Sensitivity simulations for the 2050s, relative to the 1990s suggest under the A2 (high-end) climate scenario that increased biogenic emissions alone add 1 to 3 ppb to summertime average daily maximum 8-hour ozone concentrations in the Midwest and along the eastern seaboard (Hogrefe et al., 2004). The IPCC (Meehl et al., 2007) reports that biogenic emissions are projected to increase by between 27 and 59%, contributing to a 30 to 50% increase in ozone formation over northern continental regions (for the 2090–2100 timeframe, relative to 1990–2000).

Consistent with this, for nearly all simulations in the EPA Interim Assessment (2009a), climate change is associated with increases in biogenic VOC emissions over most of the United States, with especially pronounced increases in the Southeast. These biogenic emissions increases do not necessarily correspond with ozone concentration increases, however. The report suggests that the response of ozone to changes in biogenic emissions depends on how isoprene chemistry is represented in the models—models that recycle isoprene nitrates back to NO_x will tend to simulate significant ozone concentration increases in regions with biogenic emissions increases, while models that do not recycle isoprene nitrates will tend to simulate small changes, or even ozone decreases.

Climate change impacts on temperature could affect ozone chemistry significantly (Denman et al., 2007). A number of studies in the United States have shown that summer daytime ozone concentrations correlate strongly with temperature. That is, ozone generally increases at higher temperatures. This correlation appears to reflect contributions of comparable magnitude from 1) temperature-dependent biogenic VOC emissions, as mentioned previously, 2) thermal decomposition of peroxyacetylnitrate (PAN), which acts as a reservoir for NO_x, as described immediately below, and 3) association of high temperatures with regional stagnation, also discussed below (Denman et al., 2007).

The EPA Interim Assessment (IA) (2009a), however, reports that considering a single meteorological variable, such as temperature, may not provide a sufficient basis for determining future ozone risks due to climate change in every region. This is consistent with the potential for different competing effects in different regions. The modeling studies found some regions of the country where simulated increases in cloud cover, and hence decreases in the amount of sunlight reaching the surface, partially counteracted the effects of warming temperatures on ozone concentrations in these regions, to go along with the many regions where the effects of temperature and cloud cover reinforced each other in producing ozone increases.

Climate change is projected to increase surface layer ozone concentrations in both urban and polluted rural environments due to decomposition of PAN at higher temperatures (Sillman and Samson, 1995; Liao and Seinfeld, 2006). Warming enhances decomposition of PAN, releasing NO_x, an important ozone precursor (Stevenson et al., 2005). Model simulations (using the high-end A2 emissions scenario) with higher temperatures for the year 2100 showed that enhanced PAN thermal decomposition caused this species to decrease by up to 50% over source regions and ozone net production to increase (Hauglustaine et al., 2005).

Atmospheric circulation can be expected to change in a warming climate and, thus, modify pollutant transport and removal. The CCSP (2008b) reports that stagnant air masses related to climate change are likely to degrade air quality in some densely populated areas. More frequent occurrences of stagnant air events in urban or industrial areas could enhance the intensity of air pollution events, although the importance of these effects is not yet well quantified (Denman et al., 2007). The IPCC (2007d) concluded that "extra-tropical storm tracks are projected to move poleward, with consequent changes in wind, precipitation, and temperature patterns, continuing the broad pattern of observed trends over the last half-century."

The IPCC (Denman et al., 2007) cites a study for the eastern United States that found an increase in the severity and persistence of regional pollution episodes due to the reduced frequency of ventilation by storms tracking across Canada. This study found that surface cyclone activity decreased by approximately 10 to 20% in a future simulation (for 2050, under the mid-range IPCC A1B scenario), in general agreement with a number of observational studies over the northern mid-latitudes and North America. Northeast U.S. summer pollution episodes are projected in this study to increase in severity and duration; pollutant concentrations in episodes increase 5 to 10%, and episode durations increase from two to three or four days. Analysis of historical data supports both the trend in decreasing frequency of ventilation and the increase in summer pollution episodes (Leibensperger et al., 2008).

Regarding the role water vapor plays in tropospheric ozone formation, the IPCC (Denman et al., 2007) reports that simulations for the 21st century indicate a decrease in the lifetime of tropospheric ozone due to increasing water vapor. The projected increase in water vapor both decelerates the chemical production and accelerates the chemical destruction of ozone (Meehl et al., 2007). Overall, the IPCC states that climate change is expected to decrease background tropospheric ozone due to higher water vapor and to increase regional and urban-scale ozone pollution due to higher temperatures and weaker air circulation (Denman et al., 2007; Confalonieri et al., 2007).

For North America, the IPCC (Field et al., 2007) reports that surface ozone concentration may increase with a warmer climate. For the continental United States, the CCSP (2008b) report states that the northern latitudes are likely to experience the largest increases in average temperatures, and they will also bear the brunt of increases in ground-level ozone and other airborne pollutants.

Modeling studies discussed in EPA's IA (U.S. EPA, 2009a) show that simulated climate change causes increases in summertime ozone concentrations over substantial regions of the country, though this was not uniform, and some areas showed little change or decreases, though the decreases tend to be less pronounced than the increases. For those regions that showed climate-induced increases, the increase in maximum daily 8-hour average ozone concentration, a key metric for regulating U.S. air quality, was in the range of 2 to 8 ppb, averaged over the summer season. The increases were substantially greater than this during the peak pollution episodes that tend to occur over a number of days each summer. While the results from the different research groups agreed on the above points, their modeling systems did not always simulate the same regional patterns of climate-induced ozone changes across the United States. Certain regions show greater agreement than others: for example, there is more agreement on climate-induced increases for the eastern half of the country than for the West. Parts of the Southeast also show strong disagreements across the modeling groups. Where climate-change-induced increases in ozone do occur, damaging effects on ecosystems, agriculture, and health are expected to be especially pronounced, due to increases in the frequency of extreme pollution events.

The EPA IA (U.S. EPA, 2009a) suggests that climate change effects on ozone grow continuously over time, with evidence for significant increases emerging as early as the 2020s.

The results in the IA demonstrate that O_3 responds to climate change in a qualitatively consistent manner across the simulations from multiple research groups. The patterns of relative changes in regional climate vary across the same simulations. Figure 3-11 of the IA graphically illustrates the net change in daily average ozone values across the research results for summertime ozone. Ozone concentrations increase across most areas of the country with decreases limited to some parts of the Southwest. The net increases of ozone concentrations in the large population centers of the northeastern and middle Atlantic United States are the results with the highest confidence. The net increases in the Southeast and the small net changes in the Northwest are the features with the lower confidence.

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The IA and the IPCC (Field et al., 2007; Wilbanks et al., 2007) cite a study that evaluates the effects of climate change on regional ozone in 15 U.S. cities, finding that average summertime daily 8-hour maximum ozone concentrations could increase by 2.7 ppb in the 2020s and by 4.2 ppb in the 2050s under the A2 (high-end) scenario.

Studies reviewed in the IA and Jacob and Winner (2009) indicate the largest increases in ozone concentrations due to climate change occur during peak pollution events. The locations of peak ozone episodes tend to be large metropolitan areas such as Los Angeles, Houston, and the Northeast corridor, suggesting higher increases of potentially dangerous levels of ozone over significant population centers. Mickley et al. (2004) find that climate change projected to occur under the A1B (mid-range) scenario results in significant changes that occur at the high end of the pollutant concentration distribution (episodes) in the Midwest and Northeast between 2000 and 2050 given constant levels of criteria pollutant emissions. Using the A2 (high-end) emissions scenario, Hogrefe et al. (2004) find that while regional climate change in the eastern United States causes the summer average daily maximum 8-hour ozone concentrations to increase by 2.7, 4.2, and 5.0 ppb in 2020s, 2050s, and 2080s (compared to 1990s), respectively, regional climate changes causes the fourth-highest summertime daily maximum 8-hour ozone concentrations to increase by 5.0, 6.4, and 8.2 ppb for the 2020s, 2050s, and 2080s, respectively (compared to 1990s) (Hogrefe et al., 2004). The CCSP (2008b) also reports climate change is projected to have a much greater impact on extreme values and to shift the distribution of ozone concentrations towards higher values, with larger relative increases in future decades. In addition, simulations reviewed in the IA showed that, for parts of the country with a defined summertime ozone season, climate change expanded its duration into the fall and spring. These findings raise particular health concerns.

The IPCC (Field et al., 2007) states that, "warming and climate extremes are likely to increase respiratory illness, including exposure to pollen and ozone." And the IPCC further states that "severe heat waves, characterized by stagnant, warm air masses and consecutive nights with high minimum temperatures will intensify in magnitude and duration over the portions of the United States and Canada, where they already occur (high confidence) (Field et al., 2007)." Further, as described in CCSP (2008b), there is some evidence that combined effects of heat stress and air pollution may be greater than simple additive effects and historical data show relationships between mortality and temperature extremes.

Holding population, dose-response characteristics, and pollution prevention measures constant, ozone-related deaths from climate change in the New York City metropolitan area are projected to increase by approximately 4.5% from the 1990s to the 2050s (under the high-end IPCC A2 scenario) (Field et al., 2007). According to the IPCC (Field et al., 2007), the "large potential population exposed to outdoor air pollution translates this small relative risk into a substantial attributable health risk." In New York City, health impacts could be further exacerbated by climate change interacting with urban heat island effects (Field et al., 2007). For A2 scenario in the 2050s, Bell et al. (2007) report that the projected effects of climate change on ozone in 50 eastern U.S. cities increased the number of summer days exceeding the 8-hour EPA standard by 68%. On average across the 50 cities, the summertime daily 8-hour maximum increased 4.4 ppb. Elevated ozone levels correspond to approximately a 0.11% to 0.27% increase in daily total mortality. The largest ozone increases are estimated to occur in cities with present-day high pollution.

As noted in CCSP (2008b), the influence of climate change on air quality will play out against a backdrop of ongoing regulatory control of both ozone and PM that will shift the baseline concentrations of these two important pollutants. Both emissions and climate changes can significantly affect ozone and PM concentrations. Thus, modeling of future emission control programs coupled with climate change does not isolate the impact of GHGs on air quality. Modeling of future climate change without future emission

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control programs does isolate this impact of GHGs on air quality. Further, the range of plausible short-lived emission projections is very large. For example, emission projections used in CCSP (2008d) and in the IPCC *Fourth Assessment Report* (IPCC, 2007a) differ on whether black carbon particle and nitrogen oxides emission trends continue to increase or decrease. Improvements in our ability to project social, economic, and technological developments affecting future emissions are needed. Additionally, most studies to date that have examined potential future climate change impacts on air quality isolate the climate effect by holding precursor air pollutant emissions constant over time. For the above reasons, the analyses referenced in this TSD generally held emissions constant while varying meteorological factors consistent with future climate change.

The National Ambient Air Quality Standards (NAAQS) for ozone and their accompanying regulations have helped to reduce the dangers from ozone in the United States. However, half of all Americans—158 million people—live in counties where air pollution exceeds national health standards (U.S. EPA 2008). To predict future conditions, models are essential tools. As noted in the IA, coupling atmospheric chemical processes and the climate system presents considerable challenges because of the large number of physical, chemical, and biological processes involved, many of which are poorly understood, all interacting in complex ways. The types of modeling systems developed under this assessment permit the detailed exploration of the potential responses of air quality to climate change over the next few decades in a way that would be difficult or impossible with other approaches. They permit the systematic investigation of the multiple competing climate- and weather-related drivers of air quality interactions on the regional scale, which produce aggregate patterns of air quality change. The IPCC reports (Denman et al., 2007) that "the current generation of tropospheric ozone models is generally successful in describing the principal features of the present-day global ozone distribution." The IPCC (Denman et al., 2007) also states that "there are major discrepancies with observed long-term trends in ozone concentrations over the 20th century" and "resolving these discrepancies is needed to establish confidence in the models."

In addition to human health effects, elevated levels of tropospheric ozone have significant adverse effects on crop yields in the United States and other world regions, pasture and forest growth, and species composition (Easterling et al., 2007). Furthermore, the effects of air pollution on plant function may indirectly affect carbon storage; recent research showed that tropospheric ozone resulted in significantly less enhancement of carbon sequestration rates under elevated CO_2, due to negative effects of ozone on biomass productivity and changes in litter chemistry (Easterling et al., 2007).

8(b) Particulate Matter

Particulate matter (PM) effects on public health and welfare are described in EPA's *Air Quality Criteria Document for Particulate Matter* (U.S. EPA, 2004). Particulate matter is a complex mixture of anthropogenic, biogenic, and natural materials, suspended as aerosol particles in the atmosphere. When inhaled, the smallest of these particles can reach the deepest regions of the lungs. Scientific studies have found an association between exposure to PM and significant health problems, including aggravated asthma, chronic bronchitis, reduced lung function, irregular heartbeat, heart attack, and premature death in people with heart or lung disease. Particle pollution also is the main cause of visibility impairment in the nation's cities and national parks.

The overall directional impact of climate change on PM levels in the United States remains uncertain (CENR, 2008), as too few data yet exist on PM to draw firm conclusions about the direction or magnitude of climate impacts (CCSP, 2008b). However, preliminary results of modeling analyses reported in the EPA IA are listed below. These analyses show a range of increases and decreases in PM concentrations in different regions and for different component chemical species in the same region:

1. Precipitation is a more important primary meteorological driver of PM than of ozone, due to its role in removing PM from the atmosphere (wet deposition). Precipitation, however, is particularly difficult to model and shows greater disagreement across simulations than other variables.
2. Aerosol chemical processes, especially those concerning the formation of organic aerosols, are not fully understood and therefore not well characterized in current regional air quality models.
3. Preliminary simulation results suggest that, globally, PM generally decreases as a result of simulated climate change, due to increased atmospheric humidity and increased precipitation.
4. Regionally, simulated 2050 climate change produces increases and decreases in PM (on the order of a few percent), depending on region. For the United States, the largest simulated increases are found in the Midwest and Northeast.
5. This PM response reflects the combined climate change responses of the individual species that make up PM (e.g., sulfate, nitrate, ammonium, black carbon, organic carbon). Depending on the region, these individual responses can be in competing directions.
6. Increase in wildfire frequency associated with a warmer climate has the potential to increase PM levels in certain regions.

Further, Jacob and Winner (2009) summarize the current state of knowledge as:

"The response of PM to climate change is more complicated than that for ozone because of the diversity of PM components, compensating effects, and general uncertainty in GCM projections of the future hydrological cycle. Observations show little useful correlation of PM with climate variables to guide inferences of the effect of climate change. Rising temperature is expected to have a mild negative effect on PM due to volatilization of semi-volatile components (nitrate, organic), partly compensated by increasing sulfate production. Increasing stagnation should cause PM to increase. Precipitation frequency, which largely determines PM loss, is expected to increase globally but to decrease in southern North America and southern Europe. PM is highly sensitive to mixing depths but there is no consensus among models on how these will respond to climate change... Increases in wildfires driven by climate change could significantly increase PM concentrations beyond the direct effect of changes in meteorological variables."

PM and PM precursor emissions are affected by climate change through physical response (windblown dust), biological response (forest fires and vegetation type/distribution), and human response (energy generation). Most natural aerosol sources are controlled by climatic parameters like wind, moisture, and temperature; thus, human-induced climate change is expected to affect the natural aerosol burden. Biogenic organic material is directly emitted into the atmosphere and produced by VOCs. All biogenic VOC emissions are highly sensitive to changes in temperature and are also highly sensitive to climate-induced changes in plant species composition and biomass distributions. Denman et al. (2007) cite a study in which biogenic emission rates are predicted to increase on average across world regions by 10% per 1°C increase in surface temperature. The response of biogenic secondary organic carbon aerosol production to a temperature change, however, could be considerably lower than the response of biogenic VOC emissions since aerosol yields can decrease with increasing temperature (Denman et al., 2007).

Particulate matter emissions from forest fires can contribute to acute and chronic illnesses of the respiratory system, particularly in children, including pneumonia, upper respiratory diseases, asthma, and chronic obstructive pulmonary diseases (Confalonieri et al., 2007). The IPCC (Field et al., 2007) reported with very high confidence that in North America, disturbances like wildfire are increasing and are likely to intensify in a warmer future with drier soils and longer growing seasons. Forest fires with their associated decrements to air quality and pulmonary effects are likely to increase in frequency, severity, distribution, and duration in the Southeast, the Intermountain West, and the West compared to a future with no climate change (CCSP, 2008b). Pollutants from forest fires can affect air quality for thousands of kilometers (Confalonieri et al., 2007). A study cited in Field et al. (2007) found that in the last three

decades the wildfire season in the western United States has increased by 78 days, and burn durations of large fires have increased from 7.5 to 37.1 days, in response to a spring-summer warming of 1.6°F (0.87°C). It also found earlier spring snowmelt has led to longer growing seasons and drought, especially at higher elevations, where the increase in wildfire activity has been greatest. Analysis by the state of California suggests that large wildfires could become up to 55% more frequent in some areas toward the end of the century due to continued global warming (California Climate Change Center, 2006).

PM chemistry is affected by changes in temperature brought about by climate change. Temperature is one of the most important meteorological variables influencing air quality in urban atmospheres because it directly affects gas and heterogeneous chemical reaction rates and gas-to-particle partitioning. The net effect that increased temperature has on airborne particle concentrations is a balance between increased production rates for secondary particulate matter (increases particulate concentrations) and increased equilibrium vapor pressures for semi-volatile particulate compounds (decreases particulate concentrations). Increased temperatures may either increase or decrease the concentration of semi-volatile secondary reaction products such as ammonium nitrate depending on ambient conditions.

Denman et al., 2007 note that there has been less work on the sensitivity of aerosols to meteorological conditions. It cites a study that produces regional model simulations for Southern California on September 25, 1996, projecting decreases in 24-hour average $PM_{2.5}$ concentrations with increasing temperatures for inland portions of the South Coast air basin, and projecting increases for coastal regions. In CCSP (2008b), using the New York Climate and Health Project (NYCHP)-integrated model, $PM_{2.5}$ concentrations are projected to increase with climate change, with the effects differing by component species, with sulfates and primary PM increasing markedly and with organic and nitrated components decreasing, mainly due to movement of these volatile species from the particulate to the gaseous phase.

The transport and removal of PM is highly sensitive to winds and precipitation. Removal of PM from the atmosphere occurs mainly by wet deposition (NRC, 2005). Sulfate lifetime, for example, is estimated to be reduced from 4.7 days to 4.0 days as a result of increased wet deposition (Liao and Seinfeld, 2006). Precipitation also affects soil moisture, with impacts on dust source strength and on stomatal opening/closure of plant leaves, hence affecting biogenic emissions (Denman et al., 2007). Precipitation has generally increased over land north of 30°N over the period 1900 to 2005, and it has become significantly wetter in eastern parts of North America (Trenberth et al., 2007). However, model parameterizations of wet deposition are highly uncertain and not fully realistic in their coupling to the hydrological cycle (NRC, 2005). For models to simulate accurately the seasonally varying pattern of precipitation, they must correctly simulate a number of processes (e.g., evapotranspiration, condensation, transport) that are difficult to evaluate at a global scale (Randall et al., 2007).

In 1997 (62 FR 38680), EPA concluded that particulate matter produces adverse effects on visibility, and that visibility impairment is experienced (though not necessarily attributed to climate change) throughout the United States, in multi-state regions, urban areas, and remote Federal Class I areas[53]. Visibility impairment depends strongly on ambient relative humidity (NARSTO, 2004). Although surface specific humidity globally has generally increased after 1976 in close association with higher temperatures over both land and ocean, observations suggest that relative humidity has remained about the same overall, from the surface throughout the troposphere (Trenberth et al., 2007). Nevertheless, increases in PM due to increases in wildfires induced by climate change might increase visibility impairment.

[53] The Clean Air Act defines mandatory Federal Class I areas as certain national parks (greater than 6,000 acres), wilderness areas (greater than 5,000 acres), national memorial parks (greater than 5,000 acres), and international parks that were in existence as of August 7, 1977.

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8(c) Health Effects Due to CO_2-Induced Increases in Tropospheric Ozone and Particulate Matter

In addition to the analyses described previously of climate change impacts on air quality, one study specifically examined the more direct effect of CO_2 on air pollution mortality. As described in the CCSP (2008b) report, using a coupled climate-air pollution three-dimensional model, a study compared the health effects of pre-industrial vs. present-day atmospheric concentrations of CO_2. The results suggest that increasing concentrations of CO_2 increased tropospheric ozone and $PM_{2.5}$, which increased mortality by about 1.1% per degree temperature increase over the baseline rate; the study estimated that about 40% of the increase was due to ozone and the rest to particulate matter. The estimated mortality increase was higher in locations with poorer air quality.

Two articles forwarded to KLRD by Sarah Hatch, EPA on October 7, 2010.

EPA Still Intends to Issue Ozone Standards, Implementation Rule by End of October

The Environmental Protection Agency intends to finalize more protective air quality standards for ozone by the end of October "or very close to that," Gina McCarthy, EPA assistant administrator for air and radiation, said Oct. 6.

EPA is moving forward with the rules despite objections from some senators and industry groups that the rule would impose high costs on industry during an economic downturn. Some state and industry officials had speculated that the agency might defer issuing the revised ozone standards until after the November election.

EPA intends to issue the revised national ambient air quality standards (NAAQS) for ozone as well as the implementation rule for those standards.

McCarthy told the Clean Air Act Advisory Committee she had learned from mistakes "we've made in the past" and intends to address implementation issues such as the timing of the new ozone standards and how states will model attainment at the same time that EPA finalizes the new standards.

"Setting a standard is wonderful, but I'm here to achieve the standards, as are the states," McCarthy said.

Certainty Needed

Richard Alonso, an attorney at Bracewell & Giuliani who represents power plants, boiler operators, and the cement industry, told BNA that issuing the final ozone standard with the implementation rule will provide more certainty for both state regulators and industries applying for various air emissions permits.

In the past, he said, EPA would issue the revised air quality standards but not issue the implementation rule until a year later, leaving states and industries without guidance on how emissions should be modeled and how they would need to demonstrate attainment with the new standards. Lawsuits challenging the revised standards before the implementations rules were issued would only cause more uncertainty, Alonso said.

EPA's intention to issue the implementation rule with the ozone standards will allow states and industries more certainty as they plan to comply with the revised standards, he said.

"What we're looking for is how would states make their attainment demonstrations, what are the requirements to meet the ozone" standards, Alonso said.

Delay in Standards Had Been Expected

EPA had already delayed issuing the revised standards for ozone once, and some industry and state officials speculated the agency would further delay finalizing the rule until after the November elections in the face of industry and congressional opposition. Members of the Ozone Transport Commission said during its September meeting they anticipated the final standards would be delayed (179 DEN A-3, 9/17/10).

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Seven senators signed a letter to EPA Administrator Lisa Jackson Aug. 6 disputing the need to set more protective air quality standards for ozone, citing a lack of new research into the health effects of the pollutant. Revising the standards would require industrial facilities to install expensive pollution controls that could lead to increased energy costs and job losses, according to the letter. It was signed by Sens. George Voinovich (R-Ohio), Evan Bayh (D-Ind.), Dick Lugar (R-Ind.), Mary Landrieu (D-La.), David Vitter (R-La.), Claire McCaskill (D-Mo.), and Kit Bond (R-Mo.) (152 DEN A-5, 8/10/10).

Industry groups have also disputed the need to revise the standards in comments on the proposal, disputing EPA's authority to revised the standards set in 2008. Complying with theproposed standards could cost regulated industries more than $1 trillion per year between 2020 and 2030 and would eliminate 7.3 million jobs, according to a Sept. 21 study funded by the Manufacturers Alliance, an industry trade group that includes Caterpillar, Procter & Gamble, Johnson & Johnson, Honeywell, and other manufacturers (182 DEN A-18, 9/22/10).

Standards Voluntarily Reconsidered

EPA said in August it would delay issuing the standards, which had been expected that month, until October so it can continue to analyze information it received during the public comment period (162 DEN A-2, 8/24/10).

EPA is not subject to a court deadline to finalize the ozone air quality standards, but it did agree to voluntarily reconsider the standards, set in 2008, after several states and environmental groups filed lawsuits in the U.S. Court of Appeals for the District of Columbia Circuit challenging the rules as too weak to protect public health (Mississippi v. EPA, D.C. Cir., No. 08-1200, status report filed 8/20/10)

The agency filed a status report in the case Aug. 20, informing the court of the delay.

EPA revised the national ambient air quality standards for ozone in 2008, setting both the primary and secondary standards at 0.075 part per million. The primary standard protects public health, while the secondary standard protects public welfare and the environment, particularly crops and forests.

The Obama administration stayed implementation of the standards after it proposed an even more stringent health-based standard in a range between 0.060 ppm and 0.070 ppm. To protect crops and forests, EPA also proposed setting a secondary seasonal standard within a range between seven ppm-hours and 15 ppm-hours—the weighted, cumulative exposure to ozone during daylight hours over a three-month growing season.

By Andrew Childers

EPA Says It Will Ensure Permitting In States Resisting Regulatory Program

The Environmental Protection Agency said Oct. 6 it will ensure that permits will be issued beginning next year for greenhouse gas emissions from new and modified sources, even in states that are resisting implementing the permitting scheme.

In a statement, EPA sought to clarify comments made a day earlier by an agency official who said that greenhouse gas emissions sources might be unable to begin construction on new plants or make modifications in states that are not adapting their own laws and regulations to allow permitting and are not cooperating with EPA in implementing a federal implementation plan for permitting.

"EPA has a mechanism in place to ensure permitting can occur without disruption in any states that currently do not have authority to regulate GHGs," the agency said in a statement.

EPA did not elaborate on the statement or provide details on what the mechanism would be to allow permitting to go forward. Raj Rao of EPA's Office of Air Quality Planning and Standards said in remarks to the Clean Air Act Advisory Committee Oct. 5 that those states not cooperating would face a gap in permitting authority that could prevent sources from receiving the necessary permits (192 DENA-13, 10/6/10).

Texas would be the primary state affected by EPA action to ensure greenhouse gas emissions permitting. A state official said Oct. 4 that Texas will not cooperate with the Environmental Protection Agency in issuing permits for new and modified greenhouse gas sources.

In comments to EPA, Texas Commission on Environmental Quality Executive Director Mark R. Vickery said that EPA's plan to impose federal implementation plans on states whose laws and regulations do not give them the authority to issue permits for greenhouse gas emissions exceeds its authority under the Clean Air Act.

Rather than accept a federal implementation plan and begin issuing greenhouse gas emissions permits beginning Jan. 2, when EPA will begin enforcing permitting requirements, Vickery said EPA should withdraw the proposed federal implementation plan and a proposed rule to require states to alter their state implementation plans to allow permitting.

The comments confirm Texas's status as a holdout against EPA plans to regulate greenhouse gas emissions from new and modified stationary sources.

The state wrote to EPA Aug. 2 saying the agency has a "plan for centralized control of industrial development through the issuance of permits for greenhouse gases" and that it has "called upon each state to declare its allegiance to the Environmental Protection Agency's recently enacted greenhouse gas regulations—regulations that ar plainly contrary to United States law."

Susana M. Hildebrand, chief engineer for the Texas Commission on Environmental Quality, told BNA Oct. 6 that the state will continue issuing permits for emissions of conventional air pollutants, just as it has been doing, but will not issue any permits for greenhouse gas emissions.

According to EPA, two-thirds of the states will be ready to issue permits for greenhouse gas emissions on Jan. 2.

Wyoming's Response

Wyoming indicated in a Sept. 9 letter to EPA that state law bars it from implementing the requirements and asked EPA to reconsider the rules it has issued related to regulating greenhouse gas emissions (175 DEN A-9, 9/13/10).

Wyoming said, however, in comments submitted Oct. 4 by Department of Environmental Quality Director John V. Corra that it wants to cooperate with EPA in applying a federal implementation plan to affected sources in the state. Corra said the state wants to avoid unnecessary delay in the construction of new sources.

Corra said that Wyoming and EPA could operate concurrently, with the state issuing permits for conventional pollutants as usual, and EPA issuing permits for greenhouse gas emissions. EPA has set Jan. 2 as the date on which prevention of significant deterioration (PSD) provisions of the Clean Air Act will apply to greenhouse gas emissions.

PSD requires new and modified sources to obtain permits for emissions of regulated pollutants and control them using best available control technology.

EPA announced proposals Aug. 12 that would require states to change their state implementation plans to allow them to implement greenhouse gas emissions permitting (75 Fed. Reg. 52,916; 155 DEN A-6, 8/13/10).

13 States Identified

The agency identified 13 states that it said would not have plans in place by Jan. 2. For those states, EPA also proposed a federal implementation plan to apply to greenhouse gas emissions permitting until the state has its own plans in place. EPA cannot impose a federal plan on these states unless they ask for it.

The Texas and Wyoming comments were in response to these proposals

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MARC
Mid-America Regional Council

2010 Ozone Season Report for the Kansas City Region

Summary
From April 1 – September 13, 2010 in the Kansas City region:

- MARC issued 50 yellow SkyCasts and 4 Orange SkyCasts. There were 4 Ozone Alerts.
- The eight-hour ozone concentrations exceeded the 75 part-per-billion (ppb) standard within our Air Quality Maintenance Area four times.

Reconsideration of the 2008 Ozone National Ambient Air Quality Standards
On March 12, 2008, the U.S. Environmental Protection Agency issued a final rulemaking revising national standards for ground-level ozone. The new primary, or health-based, standard was designated as 75 ppb averaged over eight hours; replacing the previous standard of 84 ppb over an eight-hour period. The 84-ppb standard was expected to remain in place until mid-2011, which would have been one year after attainment designations, at which point the new standard would have become official. In the meantime, EPA requested that air quality forecasting programs begin to issue forecasts consistent with the 2008 standard.

In September 2009, the EPA announced that it was reconsidering the 2008 standard for ground-level ozone. The new standard will be between 60-70 ppb and is to be announced by August, 2010. Until we receive different direction from the EPA, we will continue to forecast using the 2008 standard of 75 ppb as issued in their final rulemaking.

Under that 2008 rulemaking, EPA has provided an updated Air Quality Index (AQI) – a public information tool that associates colors and health messages with ranges of air pollutant concentrations – to reflect the standard. Table 1 shows the ozone concentrations associated with each AQI color under the 2008 standards.

Table 1. Air Quality Index under the 2008 Ozone Standards

Category	AQI Value	2008 8-hour ozone (ppb)
Good (Green)	0 – 50	0 - 59
Moderate (Yellow)	51 – 100	60 - 75
Unhealthy for Sensitive Groups (Orange)	101 – 150	76 - 95
Unhealthy (Red)	151 - 200	96 - 115
Very Unhealthy (Purple)	201 - 300	116 - 374
Hazardous (Maroon)	301 – 500	> 374

To ensure consistency with forecasting efforts nationally, MARC will continue to issue Ozone Alerts this summer whenever ozone concentrations are expected to exceed 75 ppb averaged over eight hours. Eight ozone monitors in the region (including those at Leavenworth and Trimble) are used to verify forecasts in 2010, and forecast verification will be based on the 2008 standard AQI.

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2010 Ozone Data & SkyCasts

Table 2 summarizes SkyCasts and eight-hour monitored ozone readings for the 2010 ozone season. The table lists days that were forecasted to be a yellow or Ozone Alert day *or* had a maximum eight-hour ozone reading greater than or equal to 60 ppb. *Green SkyCast days with maximum eight-hour ozone values less than 60 ppb—days that were accurately forecasted to be green—will not be listed.* The SkyCast categories are defined as follows: green corresponds to eight-hour ozone values less than 60 ppb, yellow is from 60 ppb to 75 ppb, and Ozone Alert is 76 ppb and above (orange is 76 - 95 ppb and red is 96 - 115 ppb).

Table 2. Summary of 2010 SkyCasts and Daily Maximum Eight-hour Ozone Values

April 1 – September 13, 2010

Date	Daily Max 8-Hr Value (ppb)*	Monitor(s) Recording Max Value	SkyCast	Date	Daily Max 8-Hr Value (ppb)*	Monitor(s) Recording Max Value	SkyCast
4/4	62J	Rocky Creek	Green	5/30	**78**	Rocky Creek	Orange
4/9	68	Watkins Mill	Green	5/31	59	Rocky Creek	Yellow
4/10	71	Watkins Mill, Heritage Park	Yellow	6/1	70D	Rocky Creek	Yellow
4/11	70	Watkins Mill	Yellow	6/2	60	Heritage Park	Yellow
4/12	70	Watkins Mill, Heritage Park	Yellow	6/3	71	Heritage Park	Yellow
4/13	73	Watkins Mill	Yellow	6/4	74	Watkins Mill	Yellow
4/14	67	Watkins Mill	Yellow	6/5	58	Liberty, Watkins Mill, Rocky Creek	Yellow
4/15	62	Watkins Mill	Green	6/16	57	Rocky Creek	Yellow
4/19	63	Heritage Park	Green	6/17	46	Watkins Mill	Yellow
4/20	71	Watkins Mill	Yellow	6/22	62	Watkins Mill	Green
4/21	62	Watkins Mill	Green	6/24	72	Heritage Park	Green
4/29	67	Watkins Mill	Yellow	6/25	**79**	Rocky Creek	Yellow
5/2	60	Watkins Mill	Green	6/26	58	Rocky Creek	Yellow
5/4	69	Watkins Mill	Green	6/28	53	Watkins Mill	Yellow
5/5	63	Watkins Mill, Heritage Park	Green	7/1	64D	Rocky Creek	Yellow
5/6	51	Watkins Mill	Yellow	7/2	75	Rocky Creek	Yellow
5/18	62	Heritage Park	Green	7/10	**76**	Rocky Creek	Yellow
5/22	50	Rocky Creek	Yellow	7/13	58	Rocky Creek	Yellow
5/25	64	Rocky Creek	Green	7/14	50	Rocky Creek	Yellow
5/27	69	Heritage Park	Green	7/15	63	Richards Gebaur	Green
5/28	66	Watkins Mill	Yellow	7/16	56	Rocky Creek	Yellow
5/29	73	Rocky Creek	Yellow	7/17	68	Rocky Creek	Orange

*The 2010 eight-hour monitored ozone readings have not been quality assured and may contain errors. Readings in **bold** represent eight-hour peak concentrations above the 75 ppb standard.

Table 2. (Cont.) Summary of 2010 SkyCasts and Daily Maximum Eight-hour Ozone Values

April 1 – September 13, 2010

7/18	58	Liberty	Yellow	8/11	**76**	Rocky Creek	Yellow
7/19	56	Liberty	Yellow	8/12	60	Rocky Creek	Orange
7/26	60	Rocky Creek	Yellow	8/13	75	Watkins Mill	Yellow
7/27	65	Rocky Creek	Yellow	8/14	62	Richards Gebaur	Yellow
7/28	64	Watkins Mill	Orange	8/18	74	Heritage Park	Yellow
8/2	65	Rocky Creek	Yellow	8/19	71	Rocky Creek	Yellow
8/3	67D	Watkins Mill	Yellow	8/21	61	Richards Gebaur	Yellow
8/4	60	Heritage Park	Yellow	8/23	52	Liberty	Yellow
8/5	62	Heritage Park	Green	8/26	68	Rocky Creek	Green
8/6	53	Rocky Creek	Yellow	8/27	63	Rocky Creek	Yellow
8/7	62	Rocky Creek	Yellow	8/28	71	Rocky Creek	Yellow
8/8	70	Rocky Creek	Yellow	9/5	63	Liberty, Rocky Creek, Richards Gebaur	Green
8/9	69	Rocky Creek	Yellow	9/6	67	Liberty	Yellow
8/10	63D	Rocky Creek	Yellow				

*The 2010 eight-hour monitored ozone readings have not been quality assured and may contain errors. Readings in **bold** represent eight-hour peak concentrations above the 75 ppb standard.

Table 3. Eight-Hour Ozone Exceedances
April 1 – September 13, 2010

Daily Maximum 8-Hour Value (ppb)								
Date	**Liberty**	**JFK**	**Rocky Creek**	**Richards-Gebauer**	**Watkins Mill**	**Heritage Park**	**Trimble***	**Leavenworth***
5/29								83
5/30			78				77	
6/25			79				82	
7/10			76					
8/11			76				88	
8/19							76	

*The Trimble and Leavenworth monitors are outside the maintenance area boundary but are used to verify SkyCast ozone forecasts due to their proximity to the boundary.

Table 3 (on the previous page) lists area monitors that have recorded eight-hour peak values exceeding the 75 ppb standard and the dates on which the exceedances occurred.

Kansas City Ozone Design Values, 2005 - 2010

Table 4. Fourth-High Readings and Design Values, 2005-2010

	Fourth-High Eight-Hour Values						Design Values			
Missouri	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**05-07**	**06-08**	**07-09**	**08-10***
Liberty	88	93	81	66	72	70	87	**80**	73	69
Watkins Mill	79	91	73	69	74	73	81	77	72	72
Rocky Creek	87	87	89	69	72	76	87	**81**	**76**	72
Richards-Gebauer	81	78	72	66	64	67	77	72	67	65
Trimble	87	85	83	70	75	76	85	**79**	**76**	73
Kansas										
JFK (KCK)	79	81	73	63	62	58	77	72	66	61
Heritage Park	81	76	71	62	63	71	76	69	65	65
Leavenworth	78	74	80	64	63	70	77	72	69	65

*The 2010 eight-hour monitored ozone readings have not been quality assured and may contain errors. Readings in **bold** represent design values above the 75 ppb standard.

Compliance with the eight-hour ozone standard is based on the three-year average of the fourth-highest ozone reading from each monitor. Under the 2008 eight-hour standard, violations will occur when the three-year average is 76 ppb or higher. **Table 4** on bottom of the previous page shows the fourth-high eight-hour readings for 2005 – 2010, as well as the design values, or three-year averages, for 2005 through 2010.

Table 5. 2010 Fourth-High Values That Would Trigger a Violation Of the 75-ppb standard

Missouri	8-Hr Value (ppb)	Kansas	8-Hr Value (ppb)
Liberty	90	JFK (KCK)	103
Watkins Mill	85	Heritage Park	103
Rocky Creek	87	Leavenworth	101
Richards Gebauer	98		
Trimble	83		

For full rule text: http://www.kdheks.gov/bar/download/KS_AQ_REGS.pdf

K.A.R. 28-19-63 Automobile and light duty truck surface coating
K.A.R. 28-19-64 Bulk Gasoline Terminals (BGT)
K.A.R. 28-19-65 Volatile Organic Compounds (VOC) Liquid Storage in a Permanent Fixed Roof Type Tanks
K.A.R. 28-19-66 Volatile Organic Compounds (VOC) Liquid Storage in External Floating Roof Tanks
K.A.R. 28-19-67 Petroleum Refineries
K.A.R. 28-19-68 Leaks from Petroleum Refinery Equipment
K.A.R. 28-19-69 Cutback Asphalt
K.A.R. 28-19-70 Leaks from Gasoline Delivery Vessels and Vapor Collection Systems
K.A.R. 28-19-71 Printing Operations
K.A.R. 28-19-72 Gas Dispensing Facilities (GDF)
K.A.R. 28-19-73 Surface Coating of Miscellaneous Metal Parts and Products and Metal Furniture
K.A.R. 28-19-74 Wool Fiberglass Manufacturing
K.A.R. 28-19-76 Lithography Printing Operations
K.A.R. 28-19-77 Chemical Processing facilities that Operate Alcohol plants or Liquid Detergent Plants
K.A.R. 28-19-712 Idle Reduction Rule
K.A.R. 28-19-714 Solvent Metal Cleaning
K.A.R. 28-19-717 Control of volatile organic compounds (VOC) emissions from commercial bakery ovens in Johnson and Wyandotte Counties.
K.A.R. 28-19-719 Fuel Volatility

Volatile Organic Compound Emission Regulations

K.A.R. 28-19-63
Automobile and light duty truck surface coating

This rule applies to automobile or light duty truck top coat and primer surface coating operations and all other automobile or light duty truck surface coating application systems at those facilities which have a VOC potential contaminant emission rate equal to or greater than three tons per year.

For the purposes of this rule, surface coating operation means the combination of all coating application systems which apply the specific class of surface coatings (top coat or primer). The VOC potential contaminant emission rate of a facility shall be determined by the maximum hourly production rate of each coating application and the assumption that the facility operates 24 hours per day, 365 days per year provided that the facility's operating hours are not otherwise limited by federally enforceable permit conditions.

K.A.R. 28-19-64
Bulk Gasoline Terminals (BGT)

No owner or operator of any bulk gasoline terminal (BGT) with a gasoline throughput of 20,000 gallons or greater daily shall cause or permit loading of gasoline into any gasoline delivery vessel (GDV) from any loading rack unless it meets one of the exceptions listed in this rule (ex: the loading rack includes a vapor collection system and a vapor processing system or an equivalent vapor control system approved by the director; and the GDV driver provides documentation showing the GDV owner or operator has complied with *K.A.R. 28-19-70 Leaks from Gasoline Delivery Vessels and Vapor Collection Systems*).

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VOC emissions to atmosphere shall be limited to 0.67 pound per 1,000 gallons of gasoline loaded.

K.A.R. 28-19-65
Volatile Organic Compounds (VOC) Liquid Storage in a Permanent Fixed Roof Type Tanks

This rule restricts any person from placing, storing or holding more than 40,000 gallons of any VOC liquid having a vapor pressure of 1.5 pounds per square inch (psi) or greater under in any stationary tank, reservoir or other container. This does not apply if the tank, reservoir, or other container is a pressure tank capable of maintaining working pressures sufficient to prevent vapor loss to the atmosphere or is designed and equipped with an approved vapor loss control device.

K.A.R. 28-19-66
Volatile Organic Compounds (VOC) Liquid Storage in External Floating Roof Tanks

This rule restricts any person from placing, storing or holding more than 40,000 gallons of any VOC liquid having a vapor pressure of 1.5 pounds per square inch (psi) or greater under in any stationary tank, reservoir or other container. This does not apply if the container is equipped with an external floating roof having a primary seal system (secondary seals extending from the floating roof to the container may also be equipped it is meets one of the requirements in this rule).

K.A.R. 28-19-67
Petroleum Refineries

This regulation bans the use of any vacuum producing system at a petroleum refinery unless the vapor emission from the condensers, hot wells or accumulators of the system is reduced by:

- Piping the non-condensable vapors to a firebox or incinerator
- Compressing the vapors and adding them to the refinery fuel gas
- Other equipment or means of equal efficiency for purposes of air pollution control as may be approved by the department

It also restricts any person from the use of waste water (oil and water) separator at a petroleum refinery unless covers and seals approved by the department and are equipped with lids or seals that are in the closed position at all times except when in actual use. A process unit turnaround at a petroleum refinery should not be performed unless a detailed procedure for minimization of VOC emissions during process has been developed and approved by the department.

K.A.R. 28-19-68
Leaks from Petroleum Refinery Equipment

This rule requires that VOC concentration leaks exceeding 10,000 parts per million (ppm) from the following sources, be repaired within 15 days.

- Pump seals, compressor seals, seal oil, degassing vents, pipeline valves, flanges, and other connections, pressure relief devices, process drains, and open ended pipes

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It also outlines the procedure if leaks cannot be repaired within the 15 day timeframe and the method for monitoring leaks—weekly, quarterly, and annually.

K.A.R. 28-19-69
Cutback Asphalt

This regulation restricts the use or application of cutback asphalt for the purposes of paving, without the approval of the department; those seeking approval must submit a request. Emulsified asphalt shall be an acceptable substitute for cutback asphalt.

The use or application of cutback asphalt may be approved where the liquefied cutback asphalt is used to produce a plant-mix for sale and use outside the areas, for filling potholes on emergency road repair or, only as an asphalt prime coat or an asphalt seal coat or absorbent surfaces.

K.A.R. 28-19-70
Leaks from Gasoline Delivery Vessels and Vapor Collection Systems

This rule disallows any person from loading or permitting the loading of gasoline from any bulk gasoline terminal (BGT) loading rack into any gasoline delivery vessel (GDV) unless the BGT loading rack is equipped with a vapor collection system that is connected to a vapor processing system and unless this person complies with the requirements of this regulation.

K.A.R. 28-19-71
Printing Operations

The provisions of this regulation apply to all packaging rotogravure, publication rotogravure and flexographic printing facilities with potential contaminant emission rate of volatile organic compounds (VOC) equal to or more than 100 tons per year. The potential contaminant emission rate calculations may include federally enforceable permit restrictions.

An owner or operator of an affected facility may not operate, allow or permit the operation of the facility unless:

- The ink contains:
    - a volatile content of 25% or less by volume VOC and 75% or more by volume water (for a water borne ink)
- The owner or operator installs and operates a vapor processing system which uses a carbon absorber or an incinerator as a VOC emissions control device or other types of VOC emissions control devices may be used upon department approval. The vapor processing system shall provide an overall emissions reduction of at least:

    - Printing Rotogravure 75%
    - Packing Rotogravure 65%
    - Flexographic 60%

K.A.R. 28-19-72
Gas Dispensing Facilities (GDF)

This regulation limits owners or operators of gasoline dispensing facilities (GDF) or gasoline delivery vessels (GDV) from permitting the transfer of gasoline from any GDV into any

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stationary storage container with a capacity greater than 2,000 gallons unless such container is equipped with a submerged fill pipe and a vapor balance system properly installed and in good working order.

K.A.R. 28-19-73
Surface Coating of Miscellaneous Metal Parts and Products and Metal Furniture

The provisions of this regulation shall be applicable to miscellaneous metal parts and products and metal furniture coating application system at those facilities which have a VOC potential contaminant emission rate equal to or greater than three tons per year on a facility-wide basis. The VOC potential contaminant emission rate of a facility shall be determined by the maximum hourly production rate of each coating application and the assumption that the facility operates 24 hours per day, 365 days per year provided that the facility's operating hours are not otherwise limited by federally enforceable permit conditions.

This regulation is not applicable to automobiles and light duty trucks (see K.A.R. 29-19-63), metal cans, customized top coating of automobiles and trucks (if less than 35 vehicles per day are processed), and automobile refinishing. Each facility subject to this regulation shall remain subject so long as this regulation remains in effect or until the facility's VOC potential contaminant emission rate is demonstrated, to the satisfaction of the department, to be always less than three tons per year.

K.A.R. 28-19-74
Wool Fiberglass Manufacturing

This regulation applies to wool fiberglass manufacturing facilities that have a VOC potential contaminant emission rate equal to or greater than 100 tons per year on a facility-wide basis. The VOC potential contaminant emission rate of a facility shall be determined by the maximum hourly production rate of each coating application and the assumption that the facility operates 24 hours per day, 365 days per year provided that the facility's operating hours are not otherwise limited by federally enforceable permit conditions.

No owner or operator of a wool fiberglass manufacturing line shall cause or allow VOC to be discharged into the atmosphere in excess of five pounds of VOC per ton of glass pulled.

K.A.R. 28-19-76
Lithography Printing Operations

The provisions of this regulation apply to all lithography printing facilities with a potential contaminant emission rate of VOCs equal to or more than 100 tons per year. It does not apply to printing on fabric, metal or plastic, sheet fed lithographic presses with cylinder widths of 26 inches or less or web lithographic presses with cylinder widths of 18 inches or less.

K.A.R. 28-19-77
Chemical Processing facilities that Operate Alcohol plants or Liquid Detergent Plants

This regulation applies to any facility that uses, produces or stores ethanol or methanol, or has a volatile organic compound potential contaminant emission rate of 100 tons per year or greater. For purposes of this regulation, the potential contaminant emission rate shall be

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determined as the sum of all potential VOC emissions from point (*process tanks, alcohol storage tanks, wastewater vents, wastewater VOC removal devices*) and fugitive sources (*all sources of VOC emissions other than point sources, including leaking valves, compressors, pumps, gauges, open-ended lines, and sample flanges*). Any VOCs present in the wastewater stream are also included as 100% of which are presumed to be emitted to the atmosphere.

Volatile Organic Compound Emission Regulations (RACT)

K.A.R. 28-19-712
Idle Reduction Rule (EFFECTIVE JUNE 25, 2010)

The Idle Reduction rule applies in Johnson and Wyandotte counties to any person who owns or operates any heavy duty diesel vehicle that is also a commercial vehicle, institutional vehicle, or public vehicle at any load or unload location. Vehicles within the provisions of this regulation may not idle for more than five minutes in any 60 minute period or longer than 30 minutes in any 60-minute period while waiting to load or unload.

For exemptions to this rule, see **28-19-712d Exemptions.**

K.A.R. 28-19-714
Solvent Metal Cleaning

The provisions of this regulation shall apply to cold cleaning, open-top vapor degreasing, and conveyorized degreasing operations located in Johnson and Wyandotte counties, and to the sale of cold cleaner solvents for use within either Johnson or Wyandotte County, or both. The regulation specifies definitions for terms used in the regulation (air cleaning system, air tight cleaning system, aqueous solvent, electronic component, and medical device) and requirements for meeting the standards.

K.A.R. 28-19-717
Control of volatile organic compounds (VOC) emissions from commercial bakery ovens in Johnson and Wyandotte Counties.

This regulation applies to new, modified, or existing commercial bakery oven facilities operating in either Johnson or Wyandotte county and have bakery ovens with a total potential for volatile organic compounds (VOCs) equal to or greater than 100 tons per year. For calculating the potential emissions, it is assumed that each facility production line is operating 24 hours a day, 365 days a year at maximum capacity and is producing with the highest level of VOC emissions of those products that is may produce.

Each commercial bakery over facility subject to this regulation is required to install and operate VOC emission control devices for each bakery oven to achieve at least 80% total removal efficiency on the combined VOC emissions of all baking ovens.

K.A.R. 28-19-719
Fuel Volatility

This rules applies to any person that dispenses, supplies, exchanges in trade, offers for sale of supply, sells or stores gasoline, or that sells, supplies, distributes, or provides gasoline to be sold within Johnson or Wyandotte County.

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From June 1st though September 15th of each year, no person shall dispense, supply, exchange in trade, offer for sale or supply, sell, or store gasoline that is to be used as a fuel for motor vehicles in either Johnson or Wyandotte County and has a Reid Vapor Pressure (RVP) greater than these levels:

- 7 pounds per square inch (psi); or
- 8.0 psi for gasoline containing ethanol in an amount to at least 9% by volume but not more than 10% by volume

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For the Full Text: http://www.sos.mo.gov/adrules/csr/current/10csr/10c10-2.pdf

10 CSR 10-2.040 Maximum Allowable Emission of Particulate Matter from Fuel Burning Equipment Used for Indirect Heating
10 CSR 10-2.070 Restriction of Emission of Odors
10 CSR 10-2.205 Control of Emissions from Aerospace Manufacture and Rework Facilities
10 CSR 10-2.210 Control of Emissions from Solvent Metal Cleaning
10 CSR 10-2.215 Control of Emissions from Solvent Cleanup Operations
10 CSR 10-2.220 Liquefied Cutback Asphalt Paving Restricted
10 CSR 10-2.230 Control of Emissions from Industrial Surface Coating Operations
10 CSR 10-2.260 Control of Petroleum Liquid Storage, Loading and Transfer
10 CSR 10-2.290 Control of Emissions from Rotogravure and Flexographic Printing Facilities
10 CSR 10-2.300 Control of Emissions from the Manufacturing of Paints, Varnishes, Lacquers, Enamels and Other Allied Surface Coating Products
10 CSR 10-2.310 Control of Emissions from the Application of Automotive Underbody Deadeners
10 CSR 10-2.320 Control of Emissions from Production of Pesticides and Herbicides
10 CSR 10-2.330 Control of Gasoline Reid Vapor Pressure (RVP)
10 CSR 10-2.340 Control of Emissions from Lithographic Printing Installations
10 CSR 10-2.360 Control of Emissions from Bakery Ovens
10 CSR 10-2.385 Control of Heavy Duty Diesel Vehicle Idling Emissions

10 CSR 10-2.040
Maximum Allowable Emission of Particulate Matter from Fuel Burning Equipment Used for Indirect Heating

This rule tightens the emission limitations on indirect heating sources, differentiates between new and existing sources and changes the method of compliance determination. It applies to installations that have indirect heating sources. The heat content of solid fuels and liquid hydrocarbon fuels shall be determined as specified in *10 CSR 10-6.040 Reference Methods*.

For the purpose of this rule only, 'existing' means any source which was in being, installed or under construction on February 15, 1979, except that if any source subsequently is altered, repaired or rebuilt at a cost of thirty percent (30%) or more of its replacement cost, exclusive of routine maintenance, it shall no longer be existing, but shall be considered as new; and 'new' means any source which is not an existing source.

Maximum allowable particulate Emission Rate (ER) for an installation of existing indirect heating sources with a heat input rate of:

- Less than ten million BTUs per hour shall be 0.60 pounds per million BTUs of heat input.
- Equal to or Greater than ten million BTUs per hour and less than or equal to five thousand million BTUs per hour shall be determined by the following equation: $E = 1.09(Q)^{-0.259}$
- Greater than five thousand million BTUs per hour shall be 0.12 pounds per million BTUs of heat input.

10 CSR 10-2.070
Restriction of Emission of Odors

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This rule restricts the emission of excessive odorous matter, stating that no person may cause, permit or allow the emission of odorous matter in concentrations and frequencies or for durations that the odor can be perceived when one volume of odorous air is diluted with seven volumes of odor-free air for two separate trials not less than fifteen minutes apart within the period of one hour.

The provisions of this rule shall not apply to the emission of odorous matter from the raising and harvesting of crops nor from the feeding, breeding and management of livestock or domestic animals or fowl except as described in *Section 4* of this rule.

10 CSR 10-2.205
Control of Emissions from Aerospace Manufacture and Rework Facilities

This rule will reduce volatile organic compound (VOC) emissions from aerospace manufacture and/or rework facilities located in the Kansas City ozone maintenance area. It is required to comply with the Clean Air Act Amendments of 1990. The rule applies to all aerospace manufacturing and/or rework facilities with potential VOC emissions exceeding 25 tons per year. It also contains definitions of individual specialty coatings and solvents and general provisions outlining limitations of use of those components.

10 CSR 10-2.210
Control of Emissions from Solvent Metal Cleaning

This regulation specifies equipment, operating procedures and training requirements for the reduction of hydrocarbon emissions from solvent metal cleaning operations.

This rule shall apply to all installations which emit volatile organic compounds (VOC) from solvent metal cleaning or degreasing operations and applies to any process that uses waterless solvents to clean and remove soils from metal parts including spray gun cleaners, cold cleaners with a solvent reservoir or tank, open-top vapor or degreasers or air-tight or airless cleaning systems. *For full list exemptions see the regulations.*

10 CSR 10-2.215
Control of Emissions from Solvent Cleanup Operations

This rule will reduce volatile organic compound (VOC) emissions from solvent cleanup operations in Clay, Jackson, and Platte Counties.

The rule applies to any person who performs or allows the performance of any cleaning operation involving the use of a VOC solvent or solvent solution. The provisions of this rule do not apply to any stationary source at which cleaning solvent VOCs are emitted at less than 500 pounds per day. *Any person performing any industrial cleaning operation must demonstrate a 30% reduction in plant-wide industrial VOC cleaning solvent emissions by May 1, 2003.*

10 CSR 10-2.220
Liquefied Cutback Asphalt Paving Restricted

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This regulation restricts volatile organic compounds emissions from cutback asphalt paving operations in Clay, Jackson and Platte Counties, limiting the use or application of liquefied cutback asphalt in paving and maintenance operations on highways, roads, parking lots and driveways.

No person may cause or permit the use or application of liquefied cutback asphalts on highways, roads, parking lots and driveways during the months of April, May, June, July, August, September and October (see rule for exemptions).

10 CSR 10-2.230
Control of Emissions from Industrial Surface Coating Operations

This regulation restricts volatile organic compound (VOC) emissions from industrial surface coating operations in Clay, Jackson and Platte Counties.

It applies to any installation with an uncontrolled potential to emit greater than 6.8 kilograms per day (kg/day) or 2.7 tons per year of VOCs from industrial surface coating operations covered under this rule. This includes any installation which does not have an allowable VOC emission limit or legally enforceable state implementation plan revision and has uncontrolled potential emissions greater than or equal to 6.8 kg/day or 2.7 tons per year. The uncontrolled potential emit is the potential emissions plus the VOC removed by emission control devices.

10 CSR 10-2.260
Control of Petroleum Liquid Storage, Loading and Transfer

This rule restricts volatile organic compound emissions from the handling of petroleum liquids in three specific areas:

- Petroleum storage tanks with a capacity greater than forty thousand gallons
- Loading of gasoline into delivery vessels
- The transfer of gasoline from delivery vessels into stationary storage containers.

It is required in order to reduce hydrocarbon emissions that contribute to the formation of ozone, and applies in Clay, Jackson, and Platte counties.

10 CSR 10-2.290
Control of Emissions from Rotogravure and Flexographic Printing Facilities

This regulation restricts volatile organic compound emissions from rotogravure and flexographic printing facilities in Clay, Jackson and Platte Counties. It applies to installations with uncontrolled potential emissions equal to or greater than two hundred fifty kilograms (250 kg) per day or one hundred tons per year of VOCs from the combination of rotogravure and flexographic printing presses.

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No owner or operator shall use or permit the use of any of the following printing presses unless they are equipped with a control device. The control device shall remove, destroy or prevent the emission of VOCs into the ambient air by at least the percentage indicated by weight of the uncontrolled VOC emissions on a daily basis.

- Flexographic (60%)
- Publication Rotogravure (75%)
- Other Rotogravure (65%)

10 CSR 10-2.300
Control of Emissions from the Manufacturing of Paints, Varnishes, Lacquers, Enamels and Other Allied Surface Coating Products

This regulation specifies operating equipment requirements and operating procedures for the reduction of volatile organic compounds from the manufacture of paints, varnishes, lacquers, enamels and other allied surface coating products in Clay, Jackson and Platte Counties.

It applies to those installations which have the uncontrolled potential to emit more than two hundred fifty kilograms per day (250 kg/day) or one hundred tons per year of VOCs from the manufacture of paints, varnishes, lacquers, enamels and other allied surface coating products.

10 CSR 10-2.310
Control of Emissions from the Application of Automotive Underbody Deadeners

This regulation restricts emissions of volatile organic compounds from the application of automotive underbody deadeners in Clay, Platte and Jackson Counties. It applies to all installations which have the uncontrolled potential to emit more than one hundred tons per year or two hundred fifty kilograms per day (250 kg/day) of VOCs from the application of automotive underbody deadeners. The emission limit shall be based on a daily weighted average of all deadeners delivered to the coating applicator.

10 CSR 10-2.320
Control of Emissions from Production of Pesticides and Herbicides

This regulation restricts emissions of volatile organic compounds from the production of pesticides and herbicides. It applies in Clay, Jackson, and Platte Counties to any pesticide or herbicide manufacturing installation with an uncontrolled potential to emit equal to or greater than two hundred fifty kilograms per day (250 kg/day) or one hundred tons per year of VOC.

10 CSR 10-2.330
Control of Gasoline Reid Vapor Pressure (RVP)

This rule limits the volatility of motor vehicle gasoline in Clay, Platte, and Jackson Counties. By reducing the amount of gasoline that evaporates into the atmosphere, VOC emissions

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will be reduced, resulting in a decrease of ambient ozone levels as well. It restricts any person from selling, dispensing, supplying, offering for sale, transporting or exchanging in trade for use gasoline intended for final use in areas that exceeds the Reid Vapor Pressure (RVP) limit of 7.0 pounds per square inch (psi) or less.

Gasoline blends having at least 9% (but not more than 10%) ethyl alcohol by volume of the blended mixture shall have an RVP limit of one pound per square inch (psi) higher than the limit contained in subsection

10 CSR 10-2.340
Control of Emissions from Lithographic Printing Installations

This regulation restricts volatile organic compound emissions from lithographic printing facilities in Clay, Jackson and Platte Counties and applies to installations that have actual VOC emissions for a known number of crewed hours, increased by the amount by weight of VOCs whose emission into the atmosphere is prevented by the use of air pollution control devices and extrapolated to eight thousand seven hundred sixty (8,760) hours per year equal to or greater than one hundred (100) tons per year from offset lithographic printing presses.

10 CSR 10-2.360
Control of Emissions from Bakery Ovens

This regulation restricts the emission of volatile organic compounds from bakery ovens at large commercial bakeries in Clay, Platte and Jackson Counties.

The rule applies to existing commercial bakeries whose potential VOC emissions are greater than one hundred tons per year and new or modified commercial bakeries whose potential emissions of VOCs is greater than one hundred tons per year upon start-up. Existing or new commercial bakeries are required to install VOC emissions control device(s) in order to achieve at least ninety percent (90%) destruction and capture efficiencies or achieve at least eighty percent (80%) total removal efficiency on the combined emissions of all baking ovens.

10 CSR 10-2.385
Control of Heavy Duty Diesel Vehicle Idling Emissions

The purpose of this rule is to implement restrictions on the idling of heavy duty diesel vehicles in the Kansas City Ozone Maintenance Area. The rule requires that all commercial, public, and institutional diesel vehicles with a Gross Vehicle Weight Rating (GVWR) of over 10,000 in the affected counties limit their idling to 30 minutes while waiting to load or unload at a location. Passenger load and unload locations are prohibited from causing or allowing vehicles covered by these regulations to idle for more than five minutes in any 60 minute period. Vehicles are also limited from idling for more the five minutes in any 60 minute period when not waiting to load or unload, unless the vehicle meets one of the exemptions.

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This regulation applies throughout Clay, Platte, and Jackson Counties to owners or operators of commercial, public and institutional heavy duty diesel vehicles that are designed to operate on public streets and highways. For a full list of exemptions see the regulations.

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Cindy Lash Sierra Club

From: Chris Cardinal [chris@principlestrategy.com]
Sent: Wednesday, October 06, 2010 5:48 PM
To: Cindy Lash
Subject: Re: Sierra Club_Further Committee questions
Attachments: coals-assault-chapter-3.pdf; ClimateStudyFinal.pdf

Cindy,

Thanks for taking care of this and assembling the list of questions for me in such a consumable fashion. I have provided responses below. I have also attached the studies requested. Again, thanks for your assistance.

Best,

Chris

Studies done by the University of Kansas and the IPCC on the health effects of CO2 on humans and information on Asthma and how it is affected by reductions in air pollution.

IPCC Reports - The worlds most exhaustive review of climate science - http://www.ipcc.ch/

KU climate study - http://www.climateandenergy.org/LearnMore/InTheNews/ClimateStudy.htm - Looks at KS impacts, and includes impacts to Western KS and Ag which finds that Temperatures in Kansas will rise in all seasons, in all parts of the state. Southwest Kansas could see increases as high as 8°F, the weather will become more variable in Kansas, evaporation rates will increase, but yearly precipitation will not increase to meet the need for additional water, and so on.

**The link above includes two PDF's that can be downloaded. One is a research summary that's only 45 pages and the other is the full study. I would assume the 45 page study would be best for the committee so I have attached it, but both the link and the study should be shared so they have access to the full study.

Health report on coal by Physicians for Social Responsibility RE: Asthma - http://www.psr.org/resources/coals-assault-on-human-health.html - There was a link to this in the testimony I provided as well. This link above goes to the website for the report, where the entire report or certain chapters can be downloaded. Chapter 3, which I have attached to this email, deals with respiratory issues.

Does the Sierra Club have a presence in China or any other countries, and if so, what types of projects is the Sierra Club working on in those countries?

We're a volunteer driven Kansas based organization, we do not have the capacity or the funding to take on international environmental campaigns.

What is the Sierra Club's ultimate goal?

To educate and enlist humanity to protect and restore the quality of the natural and human environment, to practice and promote the responsible use of the earth's ecosystems and resources, and to explore, enjoy, and protect the wild places of the earth through lawful means.

The number one priority of the Kansas Chapter of the Sierra Club is to slow climate change. We are

JOINT COMMITTEE ON ENERGY AND ENVIRONMENTAL POLICY
DATE: 10/8/10
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cont ng to this is by working to promote energy conservation and efficiency for our homes, and commercial and industrial buildings. Less fossil fuel burned means less greenhouse gasses. The cleanest energy is the energy we never consume.

We are also working towards that goal by focusing on stopping new and unnecessary sources of greenhouse gas emissions and by expanding our renewable energy resources. Renewable resources create more long term jobs than coal and do not have external and hidden health costs to citizens like coal.

With regard to the statement in your testimony on the tailoring rule which begins "The tailoring rule would focus on the largest emitters of greenhouse gas pollutants first...", does this mean the Sierra Club would support further reductions in the future, and if so, how far down should greenhouse gas regulations go (i.e. what emission levels should be subject to regulation in the future)?

We agree with the EPA's approach of targeting the largest emitters of greenhouse gas pollutants first. I cannot tell you what our position is going to be in the future. But I can guarantee that our approach will be guided by scientific research and the scientific community as it is currently. In 10 years, as it is now, our position will be based upon our ability to reach necessary reductions in greenhouse gas emissions in order to protect our, lakes, natural areas and wildlife habitat for future generations.

Does the Sierra Club have a position on outsourcing jobs to countries that do not have environmental regulations, and the related fiscal and environmental costs of transporting the resulting outsourced products back to the U.S.?

I have investigated this question. There is no official position on record, however, it is something which we would like to look at more closely. Could the committee provide documentation which shows a case of jobs being outsourced to country which does not have environmental regulations and then that product being imported back into the United States.

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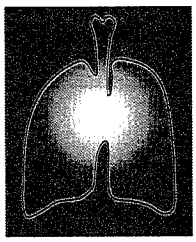
3. *Coal's Effects on the Respiratory System*

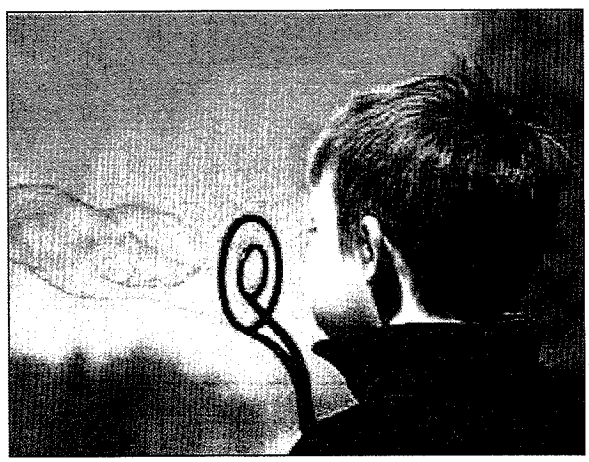


Virtually all airborne pollutants gain access to the body via the respiratory tract. Thus, it is no surprise that this important system is affected significantly by pollutants discharged into the atmosphere by electrical utilities that burn coal. These effects fall into several classes: *de novo* production of a condition, such as asthma, that did not exist prior to an exposure; an exacerbation of a previously-existing illness, again, such as asthma; and the development or progression of a chronic illness such as asthma, lung cancer, chronic obstructive pulmonary disease (COPD), and emphysema.

Data from the California Children's Health study have shown that air pollutants have clinically and statistically significant adverse effects on lung development.[1] In this prospective study, 1759 children were enrolled when they were in the fourth grade, when they were approximately 10 years old, and followed until age 18. Various measures of lung function were made periodically and correlated with their exposure to various pollutants. During normal development, the amount of air that can be forcibly exhaled in one second (FEV_1) increases with age. After controlling for various factors that could potentially confound the results, the investigators found that the FEV_1 failed to increase as predicted among children exposed to NO_2, acid vapor, and $PM_{2.5}$. Using a reduction of FEV_1 to 80% or less of the predicted value, children exposed to the highest levels of particulates were almost five times more likely to fall into the abnormal range than those with the lowest exposures. This impact on lung development is likely to be an additional risk factor for the subsequent development of other pulmonary diseases, such as asthma and chronic obstructive pulmonary disease.

ASTHMA

Asthma is a chronic disease of the lungs characterized by inflammation and narrowing of the airways. Patients with asthma experience recurrent episodes of dyspnea (shortness of breath), a sensation of tightness in the chest, wheezing, and coughing that typically occurs at night or early in the morning. Airway inflammation in asthmatics



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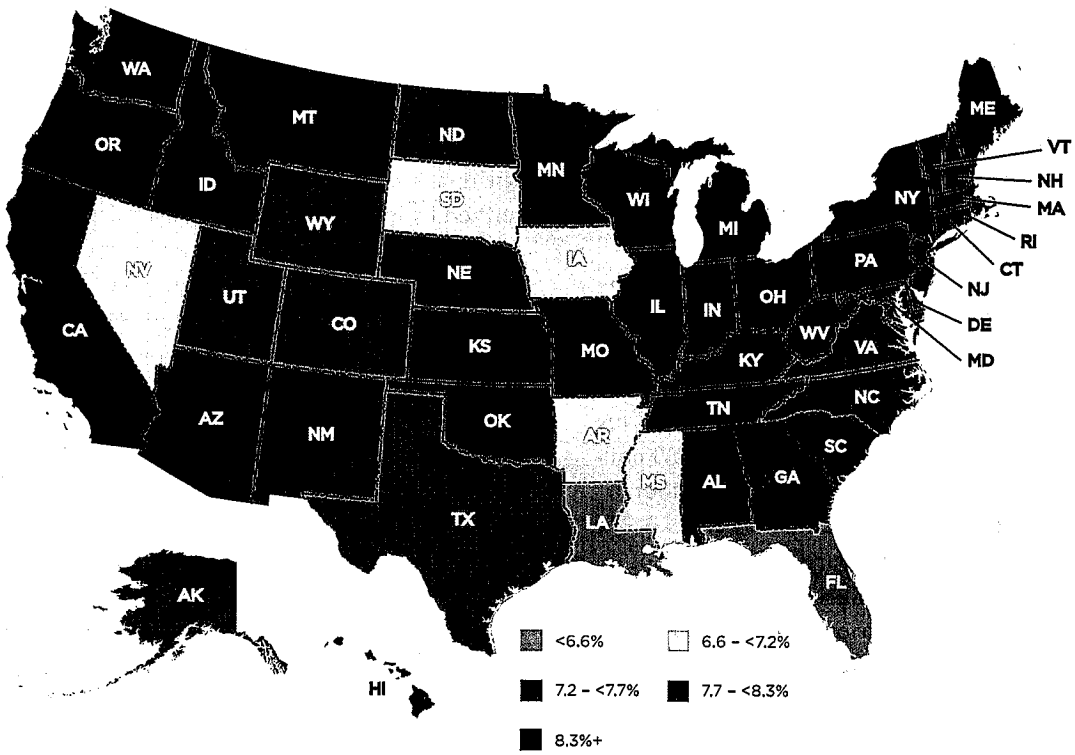
causes swelling that narrows a bronchial tree that has been previously sensitized to inhaled irritants, including many air pollutants. Exposure to an inhaled irritant causes further narrowing of the airways and the production of mucus that makes airways even narrower. During severe attacks, the lungs fail to perform their task of exchanging carbon dioxide, produced by metabolic processes in the body, for oxygen. This can lead to hypoxia (low blood oxygen level), hypercarbia (high blood carbon dioxide level), and respiratory acidosis (acidification of the blood caused by carbon dioxide retention) that may, in turn, cause cardiac arrhythmias and death. There are about 22 million asthmatics in the U.S., including 6 million children.[2] The Centers for Disease Control and Prevention report that the number of persons with asthma increased by 84% from 1980 to 2004. As shown in Figure 3.1, more than half of the states report that 8.6% or more of its inhabitants have asthma. These high-asthma states are clustered in the northeast and Midwest.

During an asthma attack, the airway is constricted due to inflammation and contraction or spasm of the muscles that surround the airway. This is associated with swelling of the tissues of the airway caused by triggers, or stimuli, which in turn cause an immune response. Asthmatics are more sensitive to these triggers than non-asthmatics, a condition known as hypersensitivity. There are many triggers, including dust, smoke, pollen, and volatile organic compounds. Some of the

Figure 3.1: CDC asthma prevalence by state

Adult self-reported current asthma prevalence rate by state, Behavioral Risk Factor Surveillance System 2007



Note: Ranges are based on quintiles of the overall prevalence estimates from year 2000 data.

Source: Air Pollution and Respiratory Health Branch, National Center for Environmental Health, Centers for Disease Control and Prevention

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OXIDATIVE STRESS

The possibility that oxygen, or reactive forms of oxygen, might be toxic to certain cellular functions emerged in the 1950s. Subsequent research has focused on the importance of highly reactive forms of oxygen, known as oxygen free radicals, in biological systems. We now know that some of these free radicals exert critical controls over normal cellular metabolic process and cellular signaling. "Oxidative stress" is the term used to describe the physiological state characterized by an excessive concentration of these oxidizing free radical molecules.

Oxidative stress is one of several mechanisms implicated in the pathogenesis of diseases caused or made worse by pollutants formed by burning coal.

Free radicals are defined as atoms or molecules that contain at least one unpaired electron in an atomic or molecular orbit and are therefore unstable and highly reactive. Examples of reactive oxygen species (ROS) include the superoxide anion radical, formed by the addition of an electron to molecular oxygen (O_2); the hydroxyl radical, the neutral form of the hydroxl ion; and peroxyl radicals, the simplest of which is the hydroperoxyl radical, composed of one molecule of hydrogen and two molecules of oxygen. More complex peroxyl radicals have an organic group (abbreviated by an R) substituted for the hydrogen molecule.

ROS are a normal cellular constituent and play critical roles in the control of many cellular functions. However, the concentration of ROS can be increased through exposure to environmental substances such as air pollution, tobacco smoke, pesticides, and solvents. When the ROS concentration is excessive, these highly reactive molecules damage lipids, proteins, DNA, cell membranes, and other cellular components, producing oxidative stress, an important contributing factor in a variety of diseases.

In a contemporary review Valko, et al., summarize the current state of knowledge of oxygen free radicals and their importance in the production of a variety of diseases including cardiovascular and pulmonary disease, as well as other conditions including atherosclerosis, hypertension, rheumatoid arthritis, diabetes mellitus, neurodegenerative disorders such as Alzheimer's disease and Parkinson's disease, and normal aging.

Valko M, Leibfritz D, Moncol J, Cronin MTD, Mazur M, Telser J. Free radicals and antioxidants in normal physiological functions and human disease. Int J Biochem and Cell Biology 2007;39:44–84.

pollutants discharged by coal fired power plants may act as triggers and produce an asthma attack. These pollutants include sulfur dioxide, nitrogen oxides, and particulate matter. In addition, the carbon dioxide emissions from coal accelerate global warming, which is likely to increase the concentration in air of pollen from some plants, such as ragweed, and thereby contribute to the development of additional asthma attacks.

Genetic variability accounts for some of the differences in the sensitivity of individuals to asthma triggers.[3] Genetic studies have shown differences in the susceptibility to ozone that are due to polymorphisms (subtle differences in genes that control the expression of a trait) in the genes responsible for dealing with oxidative stress. Oxidative stress is created when oxygen ions, free radicals, or other reactive species are produced in excess of the body's ability to remove these molecules. Oxidative stress may be an important mechanism for the production of a variety of diseases (see text box). Genetic polymorphisms responsible for controlling the inflammatory response also increase an individual's susceptibility to the respiratory effects of ozone. Thus, the probability that an individual will develop asthma depends on exposure to a trigger, such as ozone, and the individual's susceptibility to that trigger, i.e., a complex combination and interaction between genetic and environmental factors. For a review of the genetic susceptibility

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to the effects of air pollutants, such as ozone, particulates, nitrogen dioxide, and sulfur dioxide, on respiratory function see Yang, et al.[4]

Children appear to be more susceptible to the development of pollution-related asthma attacks than adults. There are several explanations for this increase in susceptibility. According to a review by Bateson and Schwartz, the susceptibility of children to the effects of air pollution is multifactorial and includes the following.[5] 1) Children have different rhythmic patterns of breathing than adults. 2) They are predominantly mouth-breathers, thereby bypassing the filtering effects of the nasal passages. This allows pollutants to travel deeper into the lungs. 3) They have a larger lung surface area per unit weight than adults. 4) They spend more time out of doors, particularly in the afternoons and during the summer months when ozone and other pollutant levels are the highest. 5) Children also have higher ventilation rates. i.e., volume of air per minute per unit body weight compared to adults. 6) When active, children may ignore early symptoms of an asthma exacerbation and fail to seek treatment, leading to attacks of increased severity. There are other factors that are important. The diameter of the airways in children is smaller than in adults and therefore airways may be more susceptible to the effects of the airway narrowing that is characteristic of asthmatic attacks. These factors, combined with the possible adverse impact of pollutants on lung development and the immaturity of enzyme and immune systems that detoxify pollutants, may all contribute to an increase in the sensitivity of children to pollutants produced by burning coal.[6]

CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD), CHRONIC BRONCHITIS AND EMPHYSEMA

Asthma is a reversible condition. When permanent damage to the airway occurs, a chronic obstructive airway condition is present.

COPD is a condition characterized by narrowing of the airway passages. Unlike asthma, these changes are permanent rather than reversible. Like asthma, exposures to pollutants that produce an immunological response are critical in the pathogenesis of the condition. The response in larger airways is referred to as chronic bronchitis. A cough that produces sputum is characteristic of chronic bronchitis. In the alveoli, the inflammatory response leads to a destruction of tissue, or emphysema. These two conditions usually co-exist. Exacerbations of COPD may be triggered by pollutants or infections. Although current and ex-smokers account for 80–85% of all patients with COPD, exposure to air pollutants, including those that are produced by burning coal, plays an important role in the pathogenesis of acute exacerbations and the development of COPD.

PULMONARY INFLAMMATION AND AIR POLLUTANTS

Inflammation of pulmonary tissues is a critical element in the pathophysiology of illness caused by air pollution. Reactive oxygen species, such as free radicals and oxygen ions, appear to be central to this process. To avoid some of the difficulties associated with in vitro studies, several investigators have studied the response to particulate pollution in experimental animals. Roberts, et al., instilled particles into the lungs of rats treated with a compound (dimethylthiourea) that is believed to blunt the response to reactive oxygen species.[7] After treatment, the lungs of the animals were lavaged (rinsed with saline) and biomarkers of pulmonary injury were measured. Treated animals exhibited less evidence of damage to their lungs such as toxicity to cells, cytokine gene expression (genes that control cellular communications), pulmonary inflammation and other markers of pulmonary injury. In a subsequent study, Rhoden, et al., instilled standardized urban air particles (active agent) or saline (placebo control) into the lungs of rats.[8] Half of the animals in each group were treated with a reactive oxygen species inhibitor. Pretreatment with the inhibitor blocked the deleterious effects of the particles, as shown by reductions in several markers of pulmonary inflammation. These studies show that common

air pollutants such as particulates interfere with a variety of basic cellular mechanisms and dispose to the development of inflammation, a process that leads to diseases such as asthma, COPD, and emphysema.

These two studies are representative of many that have been performed using a variety of agents and techniques. Although performed in animals and not humans, they are consistent with a larger body of scientific evidence that helps establish a cause-and-effect relationship between particulates and pulmonary disease. As noted above, inflammation is a critical element in the pathogenesis of attacks of asthma and exacerbations of COPD. It matters little whether the inflammation is caused by particulates or other pollutants.

Additional evidence to support the hypothesis that air pollutants produce oxidative stress is derived from many studies. Recently, Fitzpatrick, et al., studied 65 children with severe asthma, including 35 with a reduction in baseline airway function as shown by a forced expiratory volume of less than 80% of that predicted, i.e., their ability to move air rapidly out of the lung was impaired.[9] Bronchoalveolar lavage (rinsing the airway with saline) was performed and metabolites and enzymes related to oxidative stress were measured. In the asthmatics, the concentration of glutathione, an antioxidant that protects cells from free radicals, was reduced and the concentration of the oxidized form (glutathione disulfide) was increased. This made the children less able to withstand oxidative stress and more susceptible to the development of an asthmatic attack.

OZONE, AIR POLLUTION, AND ASTHMA

Ozone, a highly reactive gas that consists of three atoms of oxygen (O_3), is formed by the reaction of volatile organic compounds (VOCs) with oxides of nitrogen (NO_X) in the presence of sunlight. Coal combustion does not produce ozone directly, but both the NO_X and the VOCs released by coal plants are essential contributors to the formation of ground-level ozone, the primary ingredient in urban smog. Ozone is a powerful oxidizing agent

XAVIER GALLEGO MORELL/DREAMSTIME.COM

that irritates the lungs at concentrations typically encountered in urban settings, particularly in summer months. There are many studies linking increases in ozone to asthma and other pulmonary diseases (see Trasande and Thurston for review[10]).

One of the most compelling studies linking ozone with asthma exacerbations was performed by Gent, et al.,[11] who examined the effects of relatively low ozone levels on asthmatic children. Those authors conducted a prospective cohort study of 271 children younger than 12 who had physician-diagnosed asthma. The children were divided almost equally into groups who did or did not use daily maintenance medications. Rigorous statistical techniques were used to examine the relationship between ozone levels below EPA standards, respiratory symptoms, and the use of rescue medications as charted by the children's mothers on daily calendars. The authors found a significant association between ozone levels and symptoms, as well as the use of rescue medications in the children who used daily maintenance medications. No significant relationships were found between ozone levels and symptoms or medication use in the children who did not take daily maintenance medications. Thus, it appears that the threat to children posed by ozone is greatest among those with severe asthma, even when ambient ozone levels fall within the limits set by the EPA to protect public health.

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Peel, et al., studied the relationship between a one standard deviation increase in ambient air pollutant levels and emergency room visits for various respiratory problems, including asthma.[12] They found the strongest association between increases in 24-hour PM_{10} levels, 24-hour increases in 10–100 nm particle concentrations, and 1-hour NO_2 concentrations and asthma attacks that occurred six to eight days after the peak. There were shorter delays between peaks of PM_{10}, ozone, NO_2, and carbon monoxide and emergency room visits for upper respiratory infections. During warm months, there was a 2.6% increase in asthma admissions after a 25 ppb increase in the ozone concentration. To give the 25 ppb increase perspective, the EPA eight-hour exposure standard in 2008 was set at 75 ppb. This study is one of many that establish a statistically rigorous link between a peak in the concentration of an air pollutant and the onset of a disease or disease symptom.

Increases in the risk of death from respiratory causes, including sudden infant death, were correlated with the concentration of PM_{10} and NO_2.

The evidence linking ozone levels to the development of asthma is less compelling than that linking ozone to asthma exacerbations. Gilmour, et al., reviewed five studies that address this issue.[13] A Dutch study of over 4,000 children enrolled at birth and followed for two years, focused on NO_2 and $PM_{2.5}$ attributed to traffic, found small but statistically significant associations between pollutant peaks and the development of symptoms of asthma.[14,15] Although this study focused on traffic as the source of the pollutants, burning coal can't be ignored as a source of NO_2 and $PM_{2.5}$. There were similar results from a second study of children in that age group from the Netherlands, Germany, and Sweden. The Children's Health Study of more than 6,000 children from southern California evaluated a wide range of ozone, particulates, oxides of nitrogen, and acids.[16] A significant association between ozone and asthma was confined to those children who participated in three or more sports. This result may be the consequence of the increases in the amount of air breathed per unit of time associated with exercise and the consequent increases in exposure to pollutants. Gilmour, et al., conclude that the results of all five of the studies they reviewed "support a modest increase in the risk for air pollution in relation...to asthma."[17]

The increase in susceptibility to pollutants among children appears to translate into pollution-related increases in infant mortality. Ritz, et al., reported increases in the risk of death from respiratory causes, including sudden infant death, with rises in the concentration of carbon monoxide, PM_{10}, and NO_2.[18] Bateson and Schwartz also cite a study reporting between 4 and 7 fewer infant deaths per 100,000 live births with a reduction in the concentration of total suspended particles of 1 $\mu g/m^3$.[19] To give this number perspective, Pope, et al., reported that there was a mean reduction in the $PM_{2.5}$ concentration of 6.52 $\pm$ 2.9 $\mu g/m^3$ in major U.S. metropolitan areas in the time interval between 1979–83 and 1999–2000.[20]

AIR POLLUTION AND COPD

Smoking tobacco is the most important risk factor for the development of COPD. Most authors report that approximately 85% of all cases of COPD can be attributed to this single, preventable cause. Data that have emerged during the past several years have shown that there is a smaller but important link between air pollution, including pollutants produced by burning coal, and the subsequent development of COPD exacerbations.

In a study of the residents of Helsinki, Finland, where coal-derived air pollutants account for a relatively small portion of total pollutant levels, pooled asthma and COPD emergency room visits increased on those days when there were increases in $PM_{2.5}$, coarse particles, and gaseous pollutants.[21] The Atlanta, Georgia, study of Peel, et al., found that when NO_2 or carbon monoxide increased by one standard deviation, emergency room visits for COPD increased by 2–3%.[22] Finally, in a study of hospitalization rates among Medicare enrollees, a 10 $\mu g/m^3$ increase in the concentration of $PM_{2.5}$

particles was associated with a same-day increase in COPD admissions of 2.5% (95% confidence interval (CI) = 2.1–3.2%).[23] These three studies of three different populations using different criteria all link increases in air pollutants to increases in exacerbations of COPD. Although they did not focus on pollutants derived exclusively from the combustion of coal, the pollutants they studied included those produced by coal burned by electrical utilities as well other sources.

LUNG CANCER

The National Cancer Institute estimates that in 2008 there were 215,020 new cases of lung cancer, the leading U.S. cancer killer in both men and women, with 161,840 deaths. While smoking tobacco, radon and other radioactive gases, secondhand smoke, asbestos, arsenic, nickel compounds, and other airborne organic compounds have been identified as risk factors for developing lung cancer, data from three large epidemiological studies show that air pollution may also be a risk factor.

First among these was a study of Seventh Day Adventists who lived in California.[24] This cohort of over 6,300 non-smoking white adults was followed from 1977 to 1992 and monitored for the development of lung cancer. These data were combined with monthly ambient air pollution data in various zip codes. For men, the interquartile range (the middle 50% of the range) increase for ozone of 100 ppb was associated with an increase in the relative risk (RR) for lung cancer of 3.56 (95% CI = 1.35–9.42). Lung cancer increases were also associated with significant increases in PM_{10} (RR = 5.21, 95% CI = 1.94–13.99) and for SO_2 (RR = 2.66, 95% CI = 1.62–4.39). Smaller increases among women were also found, however only the association with SO_2 was statistically significant. The difference between men and women was thought to be due to greater exposures among men.

In the Harvard Six Cities study, lung cancer death was positively associated with air pollution. The adjusted mortality rate ratio due to lung cancer for the most to least polluted cities was 1.26 (95% CI = 1.08–1.47).[25,26]

Complementary data were found in the American Cancer Society study.[27] This epidemiological study began with 1.3 million adults in 1982. From that set, approximately 500,000 adults were matched with air pollution data for their appropriate metropolitan area and vital statistics data through the end of 1998. Fine particulate increases of 10 $\mu g/m^3$ were associated with an 8% increase in lung cancer mortality. Increases in the concentration of oxides of sulfur were also associated with increases in lung cancer mortality.

These three large prospective epidemiological studies provide evidence that air pollution, particularly that due to particulates and ozone, may affect mortality due to lung cancer. Since some of the pollutants studied are formed directly or indirectly as the consequence of burning coal, it is possible that burning coal places those exposed to coal-related pollutants at greater risk for developing lung cancer.

NOTES

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Climate Change Hits Home
The Risks to Kansas

Summary of research carried out by University of Kansas scientists Drs. Nathaniel Brunsell and Johannes Feddema, and assistants Trish Jackson, Aubrey Jones, and Kelly Logan
November 2008

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Research Summarized

Brunsell, N.A., A.R. Jones, T.L. Jackson and J.J. Feddema, 2008: Seasonal trends in air temperature and precipitation in IPCC AR4 GCM output for Kansas, USA: evaluation and implications. International Journal of Climatology, in review.

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Summary by Maril Hazlett, Ph.D., for the Climate and Energy Project (CEP) – a project of the Land Institute in Salina, KS

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Executive Summary

Climate Change Hits Home
The Risks to Kansas

Over the next century, climate change poses significant risks for Kansas – and eastern and western Kansas will be affected in very different ways. This overview summarizes recent research conducted by University of Kansas climate scientists Drs. Nathaniel Brunsell and Johannes Feddema, and assistants Trish Jackson, Aubrey Jones, and Kelly Logan.

The results show that if carbon dioxide and other greenhouse gas emissions continue to increase as projected by the middle of the road IPCC AIB scenario, then by 2100:

HEAT

Temperatures in Kansas will rise in all seasons, in all parts of the state, by an average of 2-4°F. Southwest Kansas could see a rise as steep as 8°F.

- Higher summer temperatures will create more heat waves. The number of cooling degree days (the days that people run their air conditioning) will increase by about 50%. Higher summer nighttime temperatures will also stress livestock and crops.
- Freezing days will decrease during the winter. By 2060, winter temperatures will mostly stay above freezing. The number of heating degree days (the days that people run their heaters) will decrease by about 25%. The lack of hard freezes means that insects and diseases will likely increase.

STORM INTENSITY

The weather will become more variable.

- Yearly precipitation totals are projected to stay about the same, but precipitation patterns will shift, becoming less predictable, less frequent, and broken up by longer periods of dry weather.
- There will be fewer snow events. Individual rainstorms will become more intense when they occur, likely leading to more flooding.

What climate change means for Kansas by 2100

- Increased temperatures
- Fewer frost days
- More heat waves
- Lower heating costs, higher air-conditioning costs
- More intense storm cycles – precipitation intensity increases, while frequency decreases
- Higher probability of flooding
- Less predictable precipitation cycles
- Higher evapotranspiration rates
- Decreases in soil moisture and annual moisture surplus
- The state will need more water, but less total moisture will be available

WATER

Temperatures will rise and evapotranspiration rates will increase, but yearly precipitation will not increase to meet

"WHAT'S IMPORTANT TO REMEMBER – THESE ARE PROJECTIONS. THEY ARE NOT PREDICTIONS. IF WE CHANGE HOW WE USE ENERGY AND IF WE REDUCE OUR EMISSIONS, THEN WE STILL HAVE THE POWER TO ALTER THESE OUTCOMES."

Professor Johannes Feddema, University of Kansas
speaking at K-State Extension Conference in October 2008.

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the need for additional water.

- Western Kansas will become warmer and drier. Soil moisture will decrease, putting more pressure on irrigation. During the summer, water need (the measure of how much water plants must have to grow) will increase as much as eight inches because of rising temperatures.
- Eastern Kansas will become warmer and wetter. However, the higher temperatures will likely more than offset any increases in precipitation, due to the increase in evaporation rates. The result will actually be an overall drying effect. Less water will be available for rivers and reservoirs in winter, and plant stress will increase in summer.
- Drought patterns are already intensifying across the state. The greatest decrease in winter moisture is taking place in western Kansas. The greatest increase in spring moisture is occurring in eastern Kansas.

"WHEN PEOPLE TALK ABOUT CLIMATE CHANGE, TOO OFTEN THEY IGNORE THE COSTS OF NOT DEALING WITH IT. THEY ALSO IGNORE THE ECONOMIC OPPORTUNITIES FOR KANSAS IN SHIFTING TO A CLEAN ENERGY ECONOMY." *Nancy Jackson, Executive Director, Climate and Energy Project*

What's the difference between climate change and global warming? What causes them? Global warming is the term for human-induced climate change. During at least the last fifty years, global warming has been caused by human activities that add greenhouse gases to the atmosphere. For example, burning fossil fuels such as oil, gas, and coal (which are formed from long-buried carbon sources, such as prehistoric vegetation) release ancient carbon back into today's environment as the greenhouse gas carbon dioxide (CO2). Greenhouse gases – which include methane and nitrous oxide, among others - trap excess heat in the atmosphere and warm the planet, which leads to climate change.

The risks: The term "global warming" can be confusing, because the major risk of climate change is not just increased temperatures. The biggest risk is **variability**. When we heat up the atmosphere, we make nature even less predictable. Since high temperatures change wind circulation, even slight increases in the earth's average temperature create more extreme weather patterns.

Why does climate change matter? When we emit long-buried carbon in the form of greenhouse gases, we alter not just temperature but also the planet's water balance, frequency and intensity of storms, distribution of growing seasons, and availability of natural resources. When these constants shift, it changes everything, from what we grow to how we live. Human civilization and agriculture evolved within a narrow, stable range of temperature (and CO_2 concentrations). If climate change goes unchecked, then we risk a dangerous imbalance.

Doesn't the climate change naturally, too? All sorts of natural forces also affect climate change. These include energy from the sun (which changes according to the gravitational forces of other planets), different gases in the atmosphere, the amount of light reflected from the polar ice caps, volcanic eruptions, clouds and water vapor, the ozone layer, vegetation levels, etc. Climate models include these and other natural forces as part of their calculations.

The results show that the recent observed climate shifts – global temperature increases, decreasing sea ice cover, earlier springs, warmer winters, etc. – cannot possibly be accounted for by natural forces alone. The IPCC has concluded with 95% certainty that human greenhouse gas emissions are responsible for climate changes observed during at least the past half century. 33-13

About the Research

Climate Change Hits Home
The Risks to Kansas

In spring 2007, the Climate and Energy Project (CEP) identified a major concern – exactly what risks does climate change pose for Kansas? Climate change can have drastically different regional impacts, but the existing global climate studies were not scaled to answer such a specific question.

CEP brought its concerns to two University of Kansas scientists – IPCC climatologist Professor Johannes Feddema, and Assistant Professor Nathaniel Brunsell. We asked them to consider the following question: **What are the future trends of climate change for Kansas in the 21st century?** In answer, researchers produced two papers (both currently under peer review) on temperature and precipitation projections, as well as one on drought patterns in the Kaw River Basin.

The researchers used a multi-model approach. They tested 21 IPCC-approved climate models against actual Kansas historical climate data from 1950-2000, then chose the three models that best reflected the variability of the Kansas climate. Next, they ran the models to create projections for 2010-2100, according to a "middle of the road" IPCC assumption about increases of greenhouse gases in the atmosphere (Figure 1).

The results provide a sobering answer. **Climate change poses significant risks for Kansas over the next century.** Those risks also differ substantially between eastern and western Kansas.

What is the IPCC? What does it have to do with Kansas?

Kansas is fortunate to have two IPCC scientists – Johannes Feddema of the University of Kansas, and Chuck Rice of Kansas State University.

IPCC stands for the **Intergovernmental Panel on Climate Change**. The IPCC is a scientific body established in 1988 by the World Meteorological Society and the United Nations, and its job is to review all international peer-reviewed published research on climate change. In 2007 the IPCC earned a Nobel Peace Prize for its groundbreaking Fourth Assessment Report. The report took six years to write, was reviewed by more than 2500 scientists worldwide, had more than 800 authors, and was approved by 130 governments, including the United States.

The major conclusions: The global scientific community is more than 95% certain that climate change is occurring, and that most of the temperature increases over the past fifty years result from human greenhouse gas emissions, especially carbon dioxide from burning fossil fuels.

The IPCC also concluded that this century marks a critical turning point. If we begin reducing our greenhouse gas emissions soon, then climate change will cause much less damage. If we do not reduce emissions, then the risks are extremely high that we will permanently alter the water and temperature cycles that have allowed humans to live comfortably upon on the earth.

Selection of scientific organizations and faith groups who accept the IPCC's findings: U.S. National Academy of the Sciences, American Association for the Advancement of Science, American Meteorological Society, Geological Society of America, American Chemical Society, United Methodist Church, U.S. Conference of Catholic Bishops, Presbyterian General Assembly, Episcopal Church, National Council of Churches, Evangelical Environmental Network.

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Major Findings

Temperature

Statewide, observations show that the Kansas climate is already warming slightly. Over the past century since records have been kept, the state has experienced average warming of approximately 1°F. Summer and fall show the largest warming trends. (These increases are being observed despite the fact that irrigation – which has increased significantly in western Kansas – cools temperatures locally.)

Model projections indicate that during the 21st century, the current temperature rise will double (Figure 2). Temperatures will rise in all seasons, in all parts of the state, by an average of 2°-4°F. Some regions could see much steeper warming - by 2100, southwest Kansas could warm by as much as 8°F.

CHANGES IN THE SEASONS:

- Temperatures in western Kansas will increase, especially in summer and fall (Figure 2).
- Growing degree days will increase (Figure 4). There will be fewer freezing days in the winter. Around 2060, average winter temperatures will probably be above freezing.
- Since frost days will decrease, heating degree days (the total number of days that temperatures fall below 65°F, when people turn on their heaters) could decrease as much as 25% by 2100 (Figure 3).
- However, cooling degree days (days when people use air conditioning, when temperatures are above 65°F) will increase by 50% (Figure 3).

WHAT THIS MEANS:

It will probably cost less to heat your home in the winter, but you will pay for more air conditioning in the summer. Air conditioning is less energy-efficient than heating, so more energy will be wasted.

Higher temperatures intensify human health problems – heart disease, respiratory diseases (like asthma), and the spread of epidemic disease. In urban areas, heat waves also lead to increased deaths especially among the elderly and other vulnerable populations.

The lack of hard freezes will mean more insects and diseases. Mosquitoes and ticks will thrive. More insects will lead to more pesticides, and thus more expenses for farmers. The increased run-off from agricultural chemicals will compromise water quality.

Higher summer nighttime temperatures are bad for crops – for example, wheat needs cold nighttime temperatures. Hot nights lead to plant stress, which leads to yield loss. Higher temperatures also stress livestock and alter the species composition of rangeland grasses.

Warming temperatures affect all cycles of plant growth and reproduction, and variability alters these patterns. Farmers and gardeners will have to consider planting different varieties. Wildlife and plant species will either migrate or die out. Some invasive species will expand their ranges.

Q: ISN'T A LONGER GROWING SEASON AND MORE CARBON DIOXIDE (CO_2) BETTER FOR CROPS?

A: The benefits are canceled out by the problems. The longer growing season comes with increased temperatures, and higher temperatures increase plants' need for water – but precipitation will remain about the same *(Figure 5)*, evapotranspiration will increase *(Figure 4)*, and soil moisture will gradually decrease *(Figure 6)*. In Kansas, crop yield depends on water availability, not on temperature or CO_2. Increased CO_2 levels also do not help plants unless there are additional levels of nutrients in the soil, and this requires additional fertilizer. P.S. While crops do somewhat like increased CO_2 (within limits), USDA research has shown that weeds thrive extremely well under high CO_2 conditions. Tests have also shown that existing herbicides like RoundUpTM don't work as effectively in higher CO_2 environments.

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Precipitation

Climate change will alter Kansas temperatures. Will it also change rainfall patterns? Observational trends show that currently, rainfall is increasing in winter and spring for south central and southeastern portions of the state.

Results from the climate models show two major trends. (1) Yearly precipitation totals will stay about the same, but precipitation patterns will shift, becoming unseasonal, less predictable, and less frequent. Precipitation events will be separated by longer periods of dry weather. (2) Rising temperatures will significantly alter the state's water cycle.

VARIABILITY AND STORMS

Yearly precipitation will stay about the same (Figure 5), but it will redistribute seasonally (Figure 7). Across the state, precipitation will generally decrease in summer and fall. In eastern Kansas, winter and spring precipitation will increase. In western Kansas, spring precipitation will decrease.

Climate change creates more extreme weather patterns. Precipitation will concentrate in more severe events – less frequent but more intense storms, broken up by long dry spells. While storms do not increase in number overall, the frequency of intense storms does rise.

CHANGES IN AVAILABLE WATER

Increased temperatures will create drying, which will result in a slight decrease in soil moisture surplus during winter (Figure 6). This means reduced water flow into rivers and reservoirs.

Water deficit (a measure of water need that has to be made up by irrigation) will increase significantly during the summertime, to as much as eight inches in southwestern Kansas (Figure 6). Eastern Kansas will get hotter, and may or may not get wetter. With higher temperatures leading to increased evaporation, net drying may take place even with increased precipitation (Figures 4 and 6).

WHAT THIS MEANS

Water availability will be the key to how plants, animals, and even humans respond to climate change. Eastern and western Kansas will be affected very differently.

Due to temperature rises, there will be fewer snow events. Individual rainstorms will become more intense when they occur, likely leading to more flooding during the events.

The balance between water and temperature cycles will shift – for example, when plants need more moisture during higher summer temperatures, there will be less water available.

Q: WHY WILL CLIMATE CHANGE ALTER PRECIPITATION PATTERNS AND INTENSIFY STORMS?

A: When a warmer atmosphere melts more of the polar ice caps, temperature extremes between the poles and the equator start to even out. The lack of contrast between cold and warm air slows global air circulation patterns. High pressure systems will stay in place longer. Weather systems will get trapped over one area for extended periods of time.

The need for water management strategies will increase. Reservoirs, the Ogallala Aquifer, river systems, and groundwater will experience additional stress.

Extreme weather events will cost local and state governments for preparedness, response, and recovery. Already stretched rural infrastructures will bear the burden of initial responses to these disasters.

Intense weather events damage crops, increase erosion and run-off, and keep farmers from getting into fields at crucial times in the growing season.

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Major Findings

Drought

The Great Plains have suffered major droughts in the past. Will climate change further affect existing drought cycles in Kansas? The models could not directly answer this question. Instead, researchers analyzed the record of drought frequency in the Kansas (Kaw) River Basin from 1900-2006 (Figure 8). They used the Standard Precipitation Index (SPI) to analyze data from the Global Historical Climatology Network (GHCN) from more than 150 observation stations throughout the region.

The Kaw Basin lies across the upper two-thirds of most of Kansas. It is split in half by a significant precipitation gradient – more precipitation falls to the east, while much less falls to the west. The difference is as much as 31 inches per year, ranging from 9 inches at the driest point in the west, to 40 inches in the wettest part of the east. Parts of the basin have the capacity to be extremely wet at the same time that others are extremely dry. When it comes to climate change, such a severe gradient means that even small local moisture shifts could have large effects.

DROUGHT PATTERNS TODAY:

- Over the twentieth century, areas that received less than 20 inches of precipitation per year – the western side of the basin, which is heavily agricultural and already depends on irrigation from the Ogallala - got even drier.
- The eastern basin is getting wetter – in the last century, precipitation has increased. However, it is also getting warmer, which could intensify drought in the area due to increased evaporation rates. The central part of the basin is getting wetter as well.
- Seasonally, the greatest decrease is in winter moisture in western Kansas. The greatest increase is spring moisture in eastern Kansas.
- Streamflow data shows that record lows have recently been observed for many Kansas rivers, while demand for water is rising (in part due to human withdrawals).
- Areas of Kansas that already receive the least moisture and rely most heavily on irrigation are the same areas that are the most vulnerable to drought.

WHAT THIS MEANS

On the western side of the Kaw River Basin, the need for irrigation will increase even more.

This predominantly agricultural area will suffer higher economic losses. The Federal Emergency Management Agency (FEMA) estimates that the U.S. as a whole already suffers $6-8 billion dollars in drought-related losses each year.

Drought causes crop yields to decrease, leading to increased food prices.

Wildlife and livestock suffer and die. Many wildlife species will be forced to migrate into new areas. If they cannot adapt quickly enough, they will go extinct. Native plants also face this challenge.

Water shortages will force expensive water management programs by cities, towns, and large users like farmers and ranchers. Conflict over water rights will probably increase.

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Conclusions & Solutions

Climate Change Hits Home
The Risks to Kansas

Climate change poses significant risks for the Kansas environment and thus for the state's economic well-being. A recent study by the **National Council of State Legislatures** (NCSL) estimated that climate change could cause Kansas to lose up to $1 billion per year coping with extreme weather, human health problems, and agricultural impacts.

What hurts Kansas also hurts the nation. Climate change will increase stress on America's breadbasket, risking our food security. Given that biofuels are part of the answer to America's dependence on foreign oil, climate change will compromise fuel security as well.

However, what helps Kansas can also help the nation. Fighting climate change is not just a way to avoid risk, it is also a chance to grasp opportunity. The most effective solution for avoiding the extremes of climate change is to reduce greenhouse gas emissions, encourage energy efficiency, and develop renewable energy. Adaptation to climate change will also be crucial, as water and soil management will become ever more important to the success of agriculture. Until advanced technologies make cleaner burning fossil fuels a viable and affordable possibility, soil sequestration by farmers will help reduce the nation's carbon emissions.

Kansas has a wealth of natural renewable resources – such as the third best wind resources in the nation, and abundant vegetation sources for biomass production of fuels and electricity. Southwest Kansas also has some of the top solar resources in the nation. The state of Kansas is in a better position than most to make the shift to a clean energy economy.

And if by building a clean energy economy, we can help halt climate change – then all the better.

"WE CAN DO ALL OF THIS – WE'RE JUST GOING TO HAVE TO GO ABOUT IT DIFFERENTLY THAN IN THE PAST."

USDA scientist Jerry Hatfield,
speaking at K-State Extension Conference in October 2008

"IT IS ESSENTIAL TO MOVE TOWARDS RENEWABLE AND SUSTAINABLE ENERGY. WE ALL NEED TO TAKE THE STEP."

C.T., Pretty Prairie KS

"I WANT OUR STATE TO BE GOOD STEWARDS OF OUR NATURAL RESOURCES."

D.W., Derby KS

What can you do to reduce greenhouse gas emissions?

Visit **www.climateandenergy.org** and choose your solutions – saving energy, developing renewables, and working with your elected representatives.

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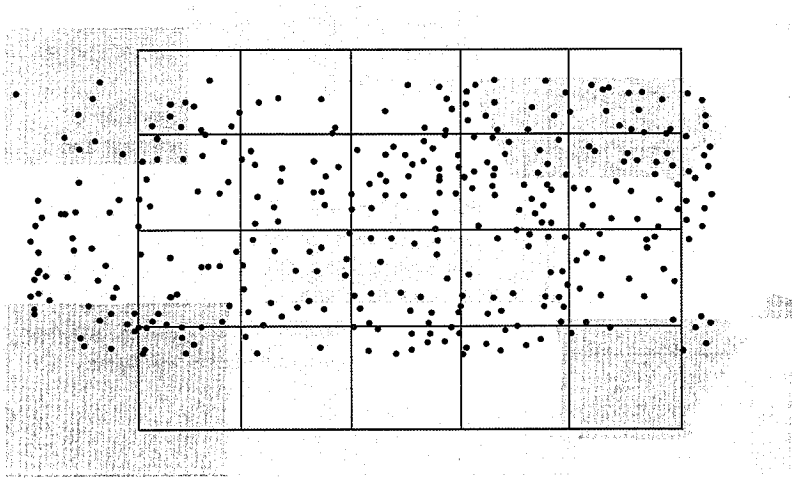
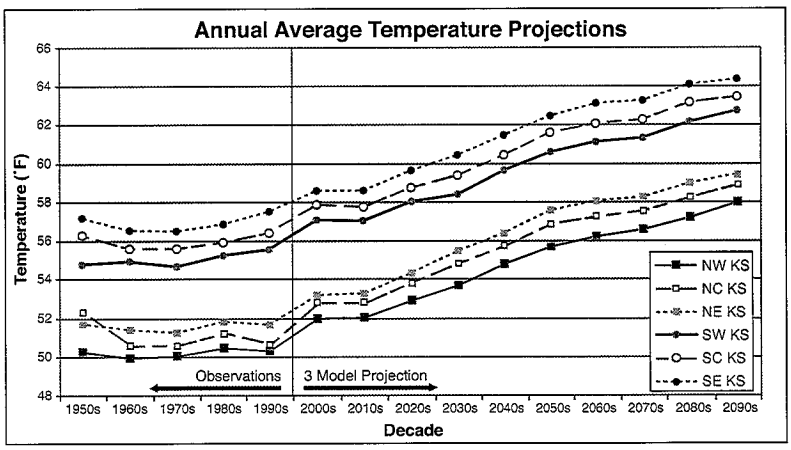
Climate Change Hits Home
The Risks to Kansas

FIGURE 1



GCM grid and GHCN sites for Kansas. To capture the variability of the Kansas climate, the temperature and precipitation projections combined climate models with actual observations of the Kansas climate. The squares represent the six grid cells of the Global Climate Models (GCM). The dots represent the measurement sites for Kansas climate data collected from NOAA's Global Historical Climate Network (GHCN). For this analysis the historical data were aggregated to provide a single set of observations for each grid cell. Brunsell and Feddema, 2008.

FIGURE 2



Annual Average Temperature Projections for Kansas thru 2100 Temperatures in Kansas will rise in all seasons, in all parts of the state, by an average of 2-4°F. Southwest Kansas could see a rise as steep as 8°F. Increased temperatures have an impact on air conditioning bills, water needs and supplies, insect and plant life, and more. Brunsell and Feddema, 2008.

The six lines in the graph represent temperature projections for the six IPCC grid regions of Kansas – northwest, north central, northeast, southwest, south central, and southeast (see Figure 1). Researchers first tested the models against actual observations, then projected future temperature trends according to "middle-of-the-road" IPCC greenhouse gas emissions scenarios.

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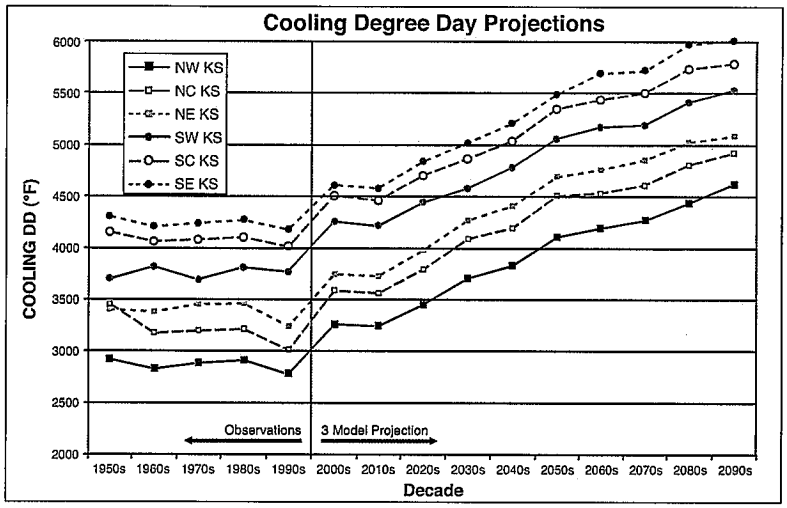
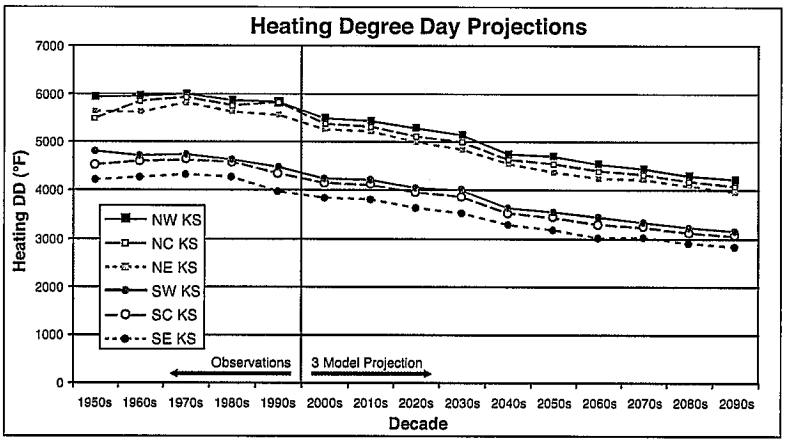
Climate Change Hits Home
The Risks to Kansas

FIGURE 3





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Heating degree day and cooling degree day projections for Kansas through 2100

Temperature increases (see Figure 2) will significantly change how we heat and cool our homes. Heating degree days will decrease by about 25%, meaning consumers will spend less to heat in the winter. However, cooling degree days will increase by more than 50% – and air conditioners are much less efficient than heaters. Summer electricity demand and costs will spike. Brunsell and Feddema, 2008.

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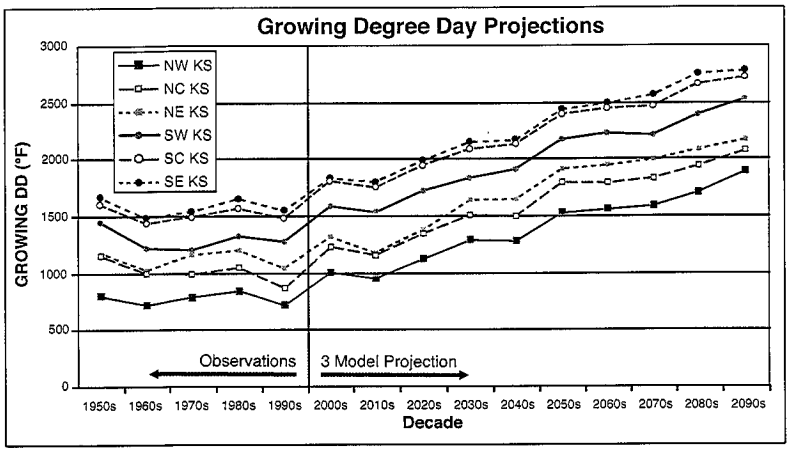
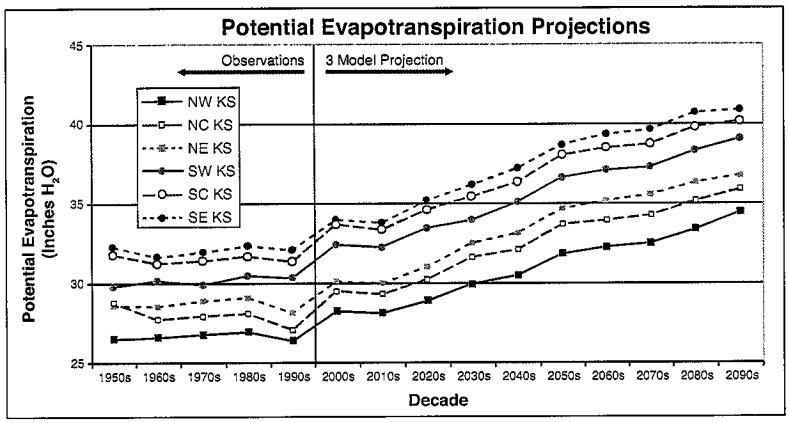
Climate Change Hits Home
The Risks to Kansas

FIGURE 4



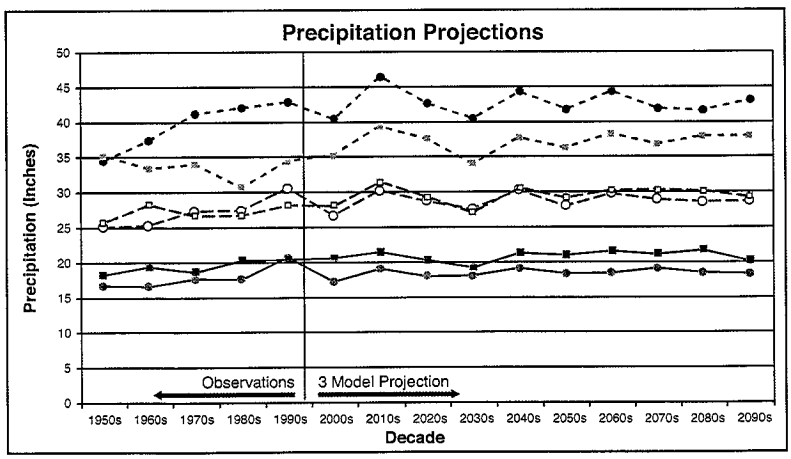


Growing degree day and potential evapotranspiration projections for Kansas through 2100

Increased temperatures (see Figure 2) mean that the growing season will lengthen in all areas of Kansas. However, this benefit will be canceled out – because the higher the temperature, the more water that plants need to grow, due to higher evapotranspiration rates. The need for water will increase across the state (see Figure 6).

Brunsell and Feddema, 2008.

FIGURE 5



Precipitation Projections for Kansas through 2100

Over the next century, our water supply from rain is likely to remain stable. However, the climate models also show that precipitation will redistribute seasonally, concentrating in more severe events with longer dry spells in between. Increased local evapotranspiration (see Figure 4) will also affect rainfall totals, but the models are not clear on exactly how that dynamic could play out.

Brunsell and Feddema, 2008.

The six lines in the graph represent temperature projections for the six IPCC grid regions of Kansas – northwest, north central, northeast, southwest, south central, and southeast (see Figure 1). Researchers first tested the models against actual observations, then projected future temperature trends according to "middle-of-the-road" IPCC greenhouse gas emissions scenarios.

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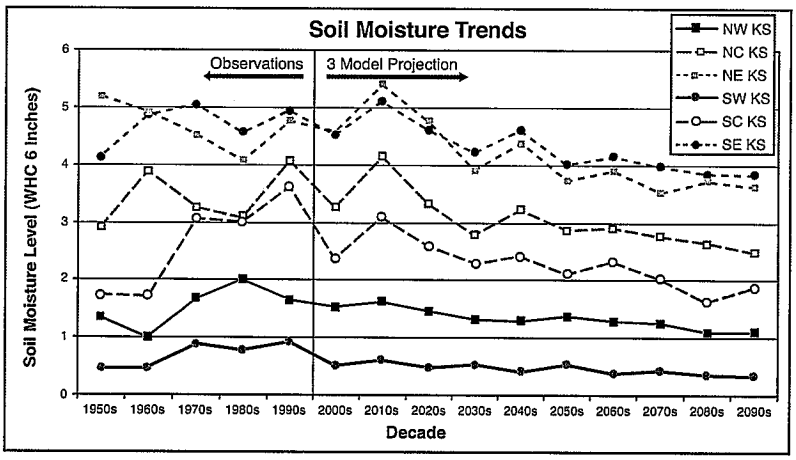
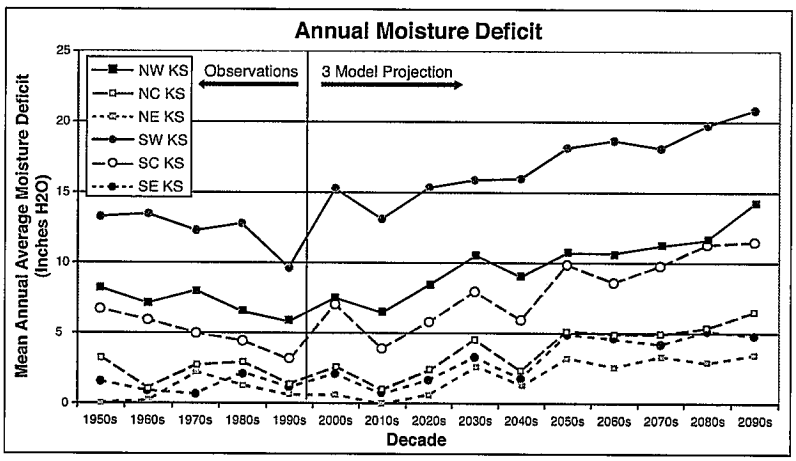
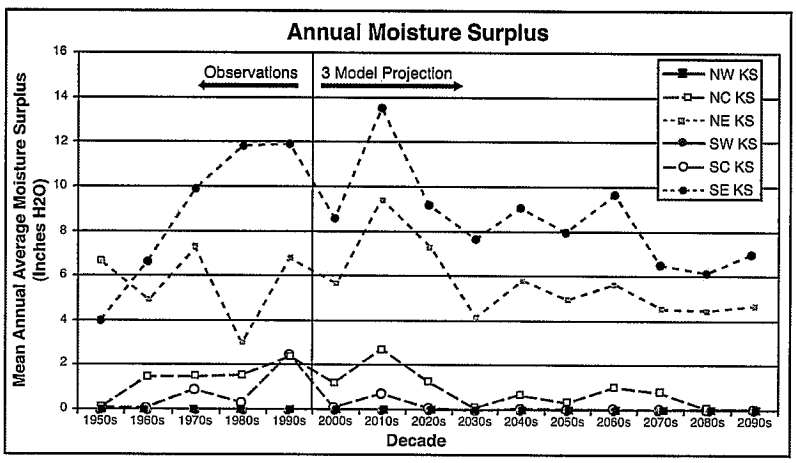
Climate Change Hits Home
The Risks to Kansas

FIGURE 6







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Annual moisture deficit, annual moisture surplus, and soil moisture trend projections for Kansas through 2100

If temperatures rise and potential evaporation increases but precipitation stays flat, what happens to water availability in Kansas over the next century? These three indicators – moisture deficit, moisture surplus, and average soil moisture content – show that water demand will definitely exceed water supply.

Moisture deficit (the difference between potential and actual evapotranspiration) is projected to increase by an equivalent of 2-8 inches for different locations (top). Moisture surplus (water available for stream flow, ground water recharge and reservoir inflows) is projected to decrease slightly (middle). Average soil moisture levels are projected to decline (bottom). Brunsell and Feddema, 2008.

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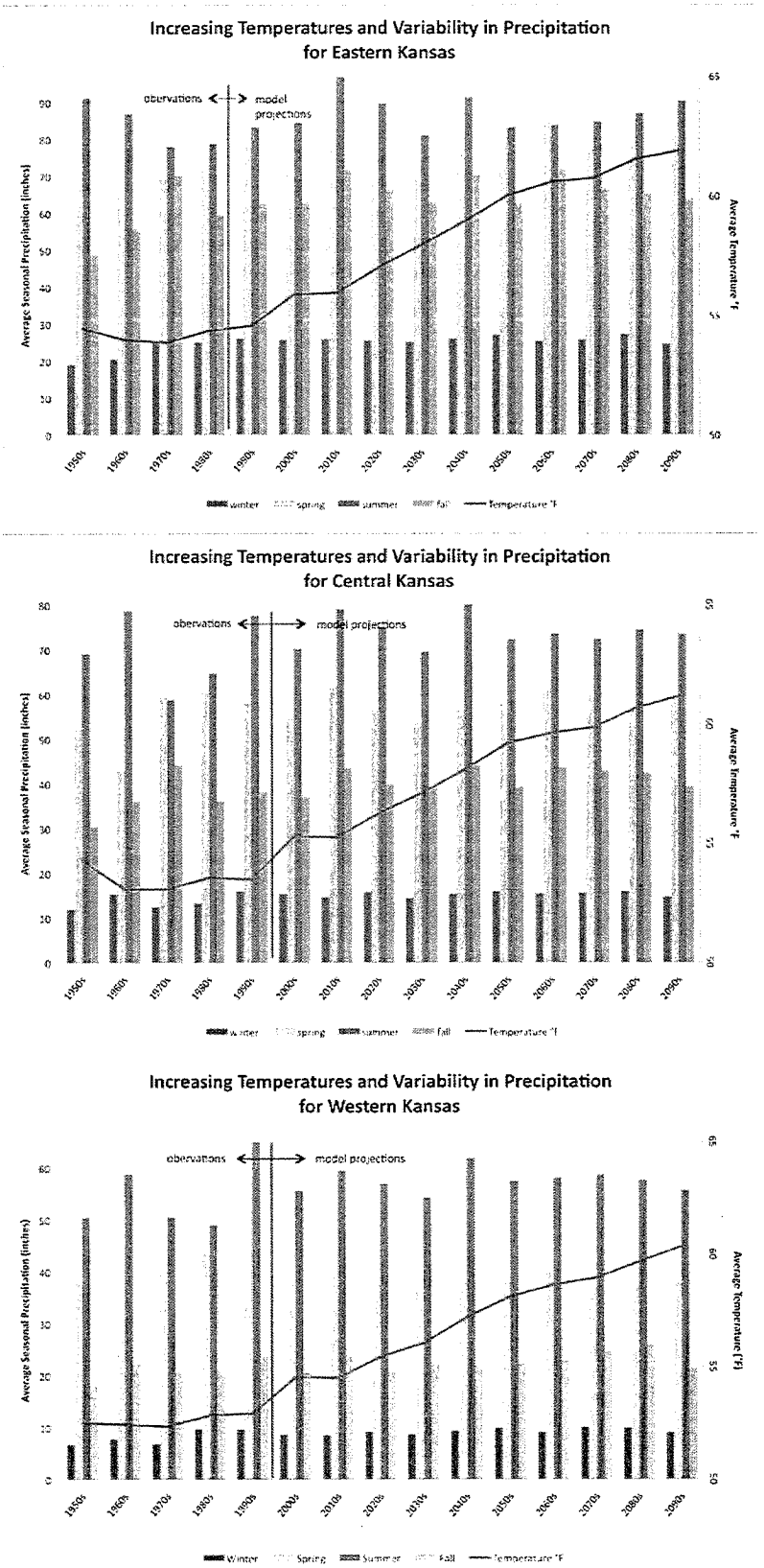
Climate Change Hits Home
The Risks to Kansas

FIGURE 7



Increasing temperatures and variability in precipitation for Western, Central, and Eastern Kansas

This graph shows past observations and predicted changes in precipitation (on the left axis) and temperature (on the right axis). Precipitation is shown as average seasonal temperatures by decade. Temperatures are also averaged by decade. As temperatures rise with climate change (see blue line), yearly precipitation totals redistribute seasonally. By 2100, spring and summer precipitation increases for eastern Kansas. For western Kansas, spring precipitation levels decrease while summer and winter precipitation stays fairly stable. For central Kansas, spring and summer precipitation increases significantly.

Brunsell and Feddema, 2008.

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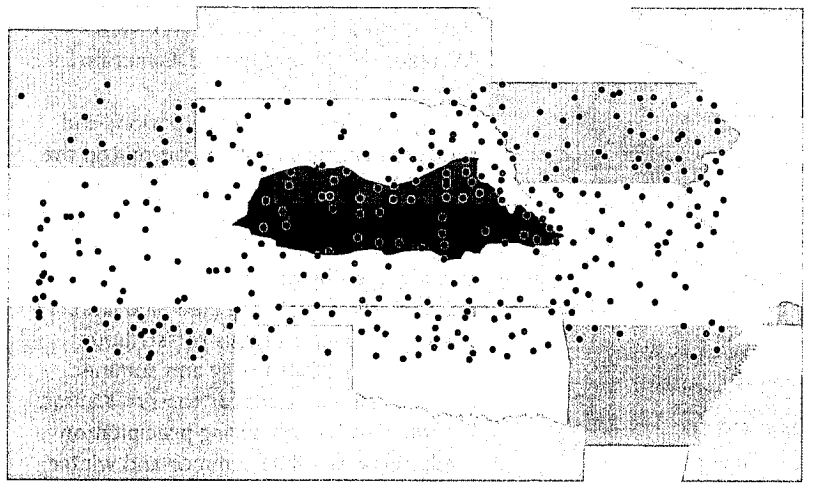
Climate Change Hits Home
The Risks to Kansas

FIGURE 8



Kansas (Kaw) River Basin
Over the past 100 years, the average annual temperature in Kansas has increased one half degree Celsius. Over that same time period, droughts in the Kaw River Basin have also increased in the western portion of the Kaw Basin, while the east has grown wetter. The dots represent temperature and precipitation stations.
Brunsell and Feddema, 2008.

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Climate Change Hits Home
The Risks to Kansas

Precipitation and Temperature Modeling

The research team combined data from two sources – global climate models (GCMs) and actual climate observations. Researchers used the observations to evaluate the models' historical performance.

The climate observations came from 337 meteorological stations across the region (Figure 1). These stations feed data into the **Global Historical Climate Network** (GHCN), a project of the **National Oceanic and Atmospheric Administration** (NOAA). Since specific meteorological stations might be skewed by variations in microclimate, researchers used a high number of stations to cancel out that effect.

The climate models were all ones used by the **Intergovernmental Panel on Climate Change** (IPCC). In order to run projections for specific regions, climate models are organized into grid cells. Six grid cells of equal size cover Kansas and parts of the surrounding states (Figure 1).

Using multiple models to make climate projections is a more reliable approach than depending on just one model. Researchers compared simulations from 21 climate models to climate observations from 1950-2000. They ended up choosing three models whose variations covered the historical range of variations in the Kansas climate. They used monthly decadal averages to evaluate trends in the climate, where climate represents the long-term average weather conditions (decadal time spans in this case).

The multiple model approach also helped mitigate a challenge for studying climate in Kansas - as Kansans well know, the state is split by an extreme precipitation gradient. Parts of far western Kansas receive only nine inches of precipitation per year. Portions of eastern Kansas receive more than forty.

To develop temperature and precipitation projections for 2010-2100, researchers then used results from these three models according to a "middle of the road" IPCC scenario of climate forcing – the AIB scenario that assumes increases in human CO2 emissions to about 770 parts per million, or ppm (compared to 385 ppm in the atmosphere today, and about 270 ppm before the Industrial Revolution of the 18th and 19th centuries). The AIB scenario represents a medium estimate of the greenhouse gases that are expected to enter the atmosphere from continued burning of fossil fuels.

Limits of Climate Data and Modeling

For more detail on this topic, please see Dr. Feddema's excellent "Climate Change in Kansas," posted with this report at **www.climateandenergy.org.**

To summarize - it is worth noting that, so far, IPCC modeling has been conservative. It has underestimated (sometimes dramatically) the rate at which climate change will impact the environment. IPCC projections have also underestimated the rates at which humans are adding carbon dioxide to the atmosphere, especially in developing countries.

Climate models also have difficulty accounting for local climate impacts, especially variations in land use. Land use patterns often exacerbate climate change impacts. The Kansas climate models could not account for two important regional land use factors:

- The increase of urbanization and encroaching woodlands in eastern Kansas.
    - Urbanization contributes to climate change in many ways. It strips the earth of vegetation and trees that sequester carbon from the atmosphere, it often results in sprawl that leads to

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traffic congestion and thus additional vehicle emissions, and it creates an urban heat island effect that complicates local weather and climate patterns.
    - The increasing invasion of trees into eastern Kansas grasslands is resulting in more first generation forest - and some forest species take in increased amounts of carbon dioxide (which could actually help mitigate CO2 levels).
- The increase of irrigation in western Kansas over the past 20-30 years.
    - Irrigation adds water vapor to the atmosphere and contributes to evapotranspiration. Irrigation in western Kansas can create cooling effects that alter precipitation patterns downwind in eastern Kansas.

The models from the Kansas climate study are much clearer on the projections for temperature than they are regarding changes for overall yearly precipitation levels. Part of the reason is the major precipitation gradient runs right through the center of Kansas. The Rocky Mountains also create a rain shadow effect that results in modeling variations for precipitation in eastern Colorado and western Kansas.

Unlike weather models, climate models study gradual changes over time. They respond specifically to slowly changing conditions in the atmosphere and Earth's surface. They also study feedback loops in the climate system - such as the loss of Arctic sea ice. As the white ice melts, the earth has less light-colored surfaces to reflect sunlight back into space. Instead, it absorbs the heat. The land/ocean surface and atmosphere then warms further, which in turn accelerates the melting of the ice. This effect is an example of a positive feedback loop, where climate changes feed on one another and multiply rapidly. Most models projected these changes to occur in about twenty years, but the last two years have seen record ice melt. This is a likely indication that the Arctic has reached a "tipping point" – a state from which it is unlikely to recover.

Drought Study

The drought study used the Standard Precipitation Index (SPI) to analyze data from the Global Historical Climatology Network (GHCN) for the Kansas River Basin. A strength of the SPI - it considers a variety of time scales. This provides a more thorough analysis of the hydrologic cycle (the way that water cycles through atmosphere, soil and vegetation, and bodies of water). A weakness - it does not consider snow and frozen ground, soil moisture, or temperature data. The latter is especially important because higher temperatures can cancel out the positive effects of increased moisture.

For more info on climate change, check out these websites:

- **www.epa.gov/climatechange/** - Environmental Protection Agency (EPA). Everything you ever wanted to know about climate change.

- **www.ipcc.ch** - The Intergovernmental Panel on Climate Change (IPCC). Read the Nobel prize-winning Assessment Reports for yourself – start with the Summary for Policymakers.

- **www.usda.gov/oce/global_change/** - United States Department of Agriculture (USDA). The latest in agriculture and climate change.

- **www.cresis.ku.edu** - Center for Remote Sensing of Ice Sheets (CRESIS). Established by the National Science Foundation (NSF), located at the University of Kansas.

- **www.ncar.ucar.edu** - National Center for Atmospheric Research.

- **www.ncdc.noaa.gov/oa/climate/ghcn-monthly/index.php** - Global Historical Climate Network (GHCN). A project of NOAA Satellite and Information Network.

- **soilcarboncenter.k-state.edu** – Resource for everyone from policymakers to scientists and farmers. All about soil carbon sequestration.

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Climate Change Hits Home
The Risks to Kansas

This summary also drew on the following resources:

CNA Corporation, "National Security and the Threat of Climate Change," found at securityandclimate.cna.org/report

IPCC Fourth Assessment Report, "Summary for Policymakers," Intergovernmental Panel on Climate Change (IPCC), 2007. Available as .pdf file at www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf.

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Solar America
www1.eere.energy.gov/solar/solar_america/index.html

American Council for an Energy Efficiency Economy (ACEEE)
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Acknowledgments
This work was funded by CEP and the National Science Foundation EPSCoR program. The researchers thank Gary Strand, Julie Arblaster and Claudia Tibaldi from the National Center of Atmospheric Research for their assistance in providing the GCM data that went into this study. Aubrey Jones, Trish Jackson, and Kelly Logan also participated in the research.

About CEP
CEP stands for the Climate and Energy Project. CEP is a nonprofit 501(c)(3) organization. Our mission is to create climate and energy conversations that lead toward concrete action to reduce greenhouse gas emissions, such as developing renewables and implementing energy conservation and efficiency. CEP was founded in 2007 by the Land Institute in Salina, Kansas.

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KANSAS

Mark Parkinson, Governor
Roderick L. Bremby, Secretary

DEPARTMENT OF HEALTH
AND ENVIRONMENT

www.kdheks.gov

Division of Environment

September 27, 2010

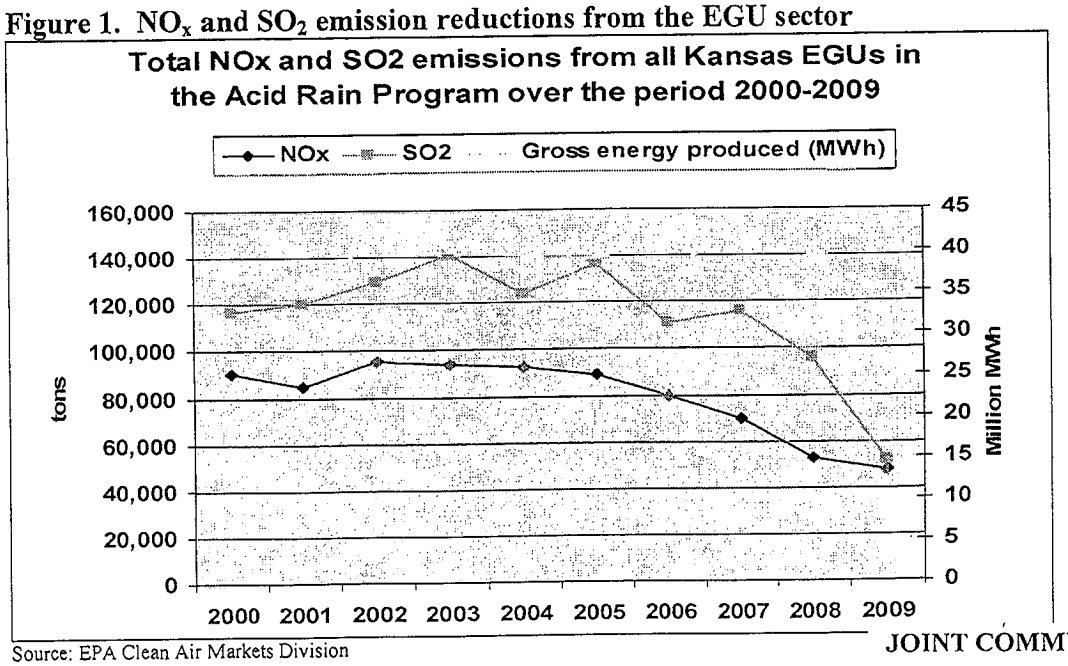
The Honorable Lisa Jackson, Administrator
EPA Docket Center, EPA West (Air Docket)
Attention Docket ID No. EPA-HQ-OAR-2009-0491
U.S. Environmental Protection Agency, Mail Code: 2822T
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Re: Submission of Comments on the Proposed Clean Air Transport Rule, Docket ID No. EPA-HQ-OAR-2009-0491

Dear Administrator Jackson:

The Kansas Department of Health and Environment (KDHE) is pleased to provide EPA comments on the proposed Clean Air Transport Rule. KDHE supports the efforts of EPA to have a multi-state rule that reduces transport of emissions that impact attainment of the NAAQS throughout the United States. As you are likely aware, Kansas emission sources, particularly electric generating units (EGUs), have made significant reductions in emissions over the last several years. These emissions reductions continue to occur now in 2010, and additional reductions will occur for several years to come as additional controls are put in place and utilized. Figure 1 demonstrates the significant improvements that Kansas utilities have made over the last 10 years.

Figure 1. NO_x and SO_2 emission reductions from the EGU sector



Source: EPA Clean Air Markets Division

CURTIS STATE OFFICE BUILDING, 1000 SW JACKSON ST., STE. 4(
Voice 785-296-1535 Fax 785-296-8464

JOINT COMMITTEE ON ENERGY AND ENVIRONMENTAL POLICY
DATE: 10/8/10
ATTACHMENT 34

In our review of the proposal, we support many of the technical approaches EPA has used to determine contributions to nonattainment, specifically the use of "best science" tools such as CAMx with source apportionment. KDHE believes tools such as CAMx can provide valuable insights into culpability assessments if proper inputs are used and correct interpretations are made. It appears EPA is making an attempt to utilize the latest available emissions and tools to inform policy decisions, and we commend EPA for this.

During our review of the rule we have identified several inconsistencies in the emissions modeling inputs that we believe could lead to a significant overestimation of contribution to nonattainment from Kansas sources. Specifically, emissions from several electric utility generation units in the state are overestimated in the 2012 base year used for the contribution assessment. This appears to occur due to the use of older data, which EPA has stated it intends to correct in the Notice of Data Availability (NODA) that was published in the *Federal Register* on September 1, 2010. KDHE encourages EPA to follow through and use the latest available data for both emission rates and heat inputs for the electric utility sector.

In the following sections we identify emissions overestimations that need corrected for the final modeling runs. In addition to the emissions overestimations, the proposed implementation timeframe for controls is very aggressive, and we believe possibly unattainable for several Kansas sources. There also appear to be inconsistencies in the proposed allocations which, depending on the remedy option EPA chooses, could unfairly impact a given source. All of these issues among others are discussed in detail below, along with proposed recommendations.

Emissions Inventory Issues

KDHE has compared the projected 2012 emissions estimates with actual emissions for our EGU sector. Figures 2 and 3 provide comparisons of recent actual emissions at the unit level with EPA 2012 estimates for NO_x and SO_2, respectively. These comparisons were made with the original IPM estimates. We have left the original IPM numbers in, since it is unclear how these NODA revisions will impact final allocations. Appendix A contains tables comparing historic unit level emissions with projected IPM emissions and proposed allocations.

For NO_x, Figure 2 clearly indicates the projected 2012 emissions are much higher than recent historic actual emissions. This is an indication that the 2012 IPM estimates don't accurately reflect control equipment installed on Kansas EGUs.

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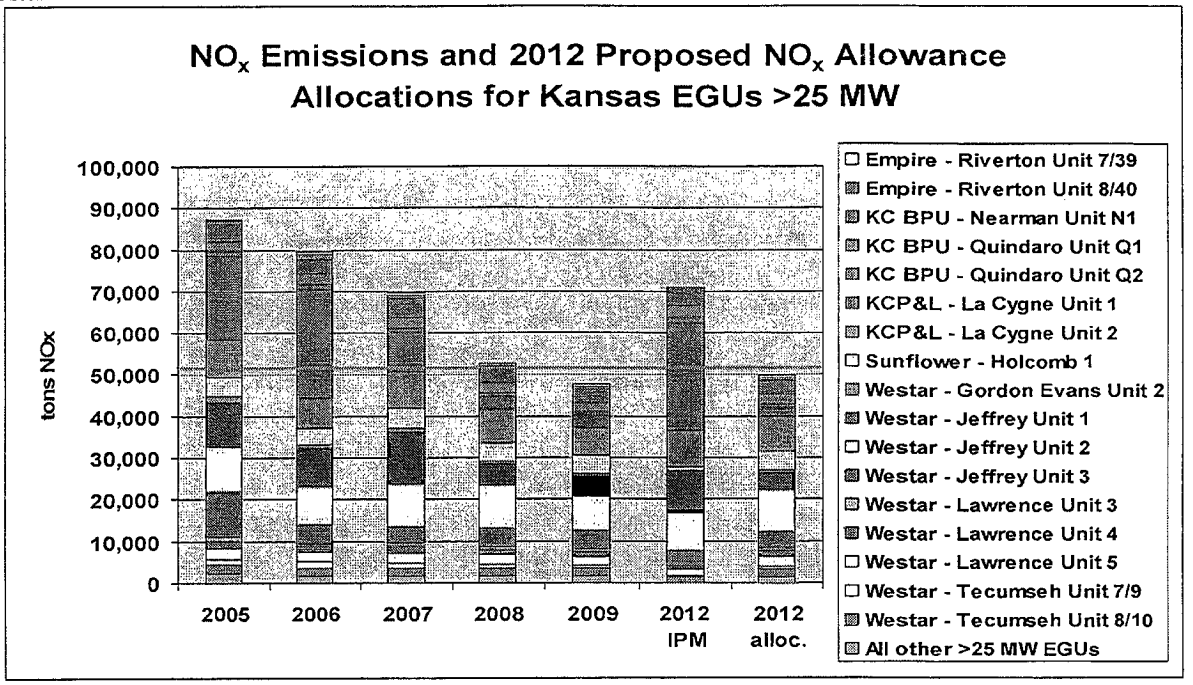
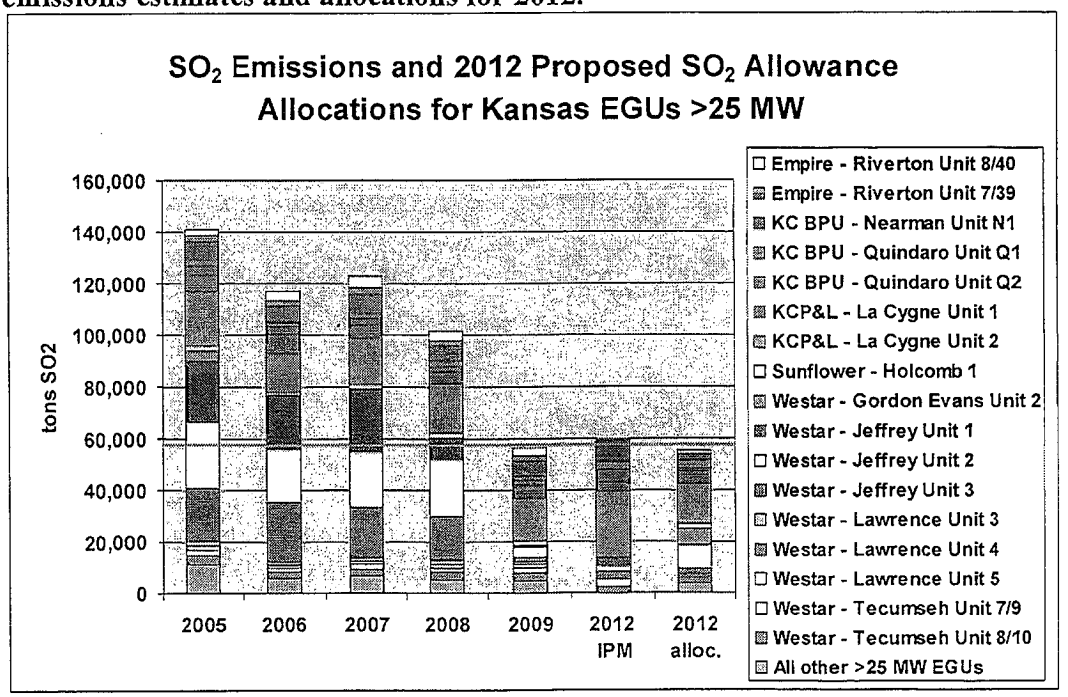
Figure 2. Historical NO_x emissions from Kansas EGUs > 25 MW with proposed Transport Rule emissions estimates and allocations for 2012.



For SO_2, Figure 3 indicates the recent actual SO_2 emissions are very close to the future IPM emissions. While the future SO_2 estimates appear close to likely actual emissions, a detailed unit-level look at the future emissions estimates indicates that further reductions need to be accounted for. These reductions are discussed in detail below with KDHE recommendations.

Figure 3. Historical SO_2 emissions from Kansas EGUs > 25 MW with proposed Transport Rule emissions estimates and allocations for 2012.



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Based on these comparisons, KDHE believes several significant differences in the 2012 emissions estimates EPA is using will result in an overestimate of our modeled contribution to downwind nonattainment areas. These overestimates may be large enough that if corrected would remove Kansas from the list of ozone-contributing states. Specifically, the 2012 NO_x estimates for KCP&L's La Cygne Unit 1 were too high in the original version of the IPM run and did not account for the SCR that is currently installed and operating on this unit. This appears to have been corrected in the latest version of the IPM run, possibly even being overcorrected. In addition, 2012 emission estimates for Westar Energy's Jeffrey Units 1–3 do not take into account the recent consent decree this company entered into with the United States Department of Justice (USDOJ) that will require NO_x and SO_2 reductions by 2012. This problem appears in both IPM runs.

La Cygne Unit 1 currently has a 2009 Clean Air Markets Division (CAMD) annual NO_x rate of 0.11 lb/MMBtu. This is also the average rate for two years of actual operations with its SCR in operation. KDHE recommends for purposes of modeling that the 2009 average NO_x rate of 0.11 lb/MMBtu be used in conjunction with the projected 2012 IPM heat input to estimate the emissions for La Cygne Unit 1 in 2012. KDHE believes this rate will be reflective of future operations for this control equipment. This recommended 0.11 lb/MMBtu rate is higher than the latest IPM rate of 0.06 lb/MMBtu, which appears to KDHE to be too optimistic based on historic operations of the SCR. La Cygne Unit 1 is required to continually operate this SCR for NO_x control. The requirement for this unit to operate the SCR is included in a state construction permit issued by KDHE on November 18, 2005. This permit limits this unit to 0.15 lb/MMBtu annually for NO_x emissions. This permit condition will continue to apply in 2012 and thereafter. In addition to the construction permit, KCP&L has signed an agreement incorporating the 0.15 lb/MMBtu limit that will be submitted to Region 7 for incorporation in the Kansas State Implementation Plan (SIP) in the near future. This agreement is intended to ensure "SIP enforceable" limits. The limits for the two coal-fired units at this facility will be further strengthened with upcoming BART controls as part of the Regional Haze Program, once approved by EPA. These BART control requirements will occur after the 2012 timeframe, however. The SCR construction permit and agreement for La Cygne Unit 1 is included in Appendix B.

For Jeffrey Units 1–3, a consent decree between the USDOJ and Westar Energy went into effect on March 26th, 2010, that requires substantial reductions in both NO_x and SO_2. For NO_x the consent decree requires a 30-day rolling average unit emission rate for NO_x of no greater than 0.180 lb/MMBtu beginning on December 31, 2011, and continuing thereafter. This rate applies to all three units at all times of the year. The new IPM runs and 2009 CAMD rates should therefore reflect emissions for Unit 3 with controls. However, the 2009 rates for Units 1 and 2 do not yet reflect the limits that will be required on these units by 2012.

KDHE recommends using the average 2010 CAMD emission rates of Units 1 and 3 for a proxy of the 2012 emission rate of Unit 2. For Unit 1 we recommend using the 2010 CAMD average rate. We make these recommendations based on the similar characteristics of the units' design and controls and the fact that all three units are subject to the same limits in the consent decree. Because these controls have just recently been installed, 2010 CAMD data is a more accurate estimate of future emission rates for Unit 1. Unit 2 does not currently have the controls to meet the limit but will by 2012, thus the average of like unit rates with controls should be a good

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estimate for this unit. At a minimum, Unit 2 should not be modeled higher than the consent decree limit of 0.18 lb/MMBtu.

For SO_2 at Jeffrey, the consent decree limits the three Jeffrey units to 6,600 tons total SO_2 on a rolling 12-month basis. The agreement also limits the units to 0.07 lb/MMBtu SO_2. These units all recently had scrubber rebuilds and all units are now operating with scrubbers. KDHE recommends that 2009 CAMD SO_2 emission rates for Units 1 and 3 be used to reflect 2012 emission rates. For Unit 2, KDHE recommends the average emission rate in 2010 be used as this unit's flue gas desulfurization was not operational until 2009.

The Westar Energy consent decree can be found at:
http://www.epa.gov/compliance/resources/decrees/civil/caa/westarenergy-cd.pdf.

Emissions from EGUs in the Kansas City area are subject to a Kansas NO_x emissions reduction rule, K.A.R. 28-19-713a. This rule will impact the emissions of two units in the Kansas City area. The units are Kansas City BPU's Nearman Creek Unit 1 (N1) and BPU Quindaro Unit 2 (Q2). The rule limit requirements are identified below.

> **28-19-713a. Emission limitation requirements.** No owner or operator subject to K.A.R. 28-19-713 shall allow any emission unit to emit nitrogen oxides in excess of the following emission limitations based on a 30-day rolling average: (a) From electric generating units, for the purposes of K.A.R. 28-19-713 through K.A.R. 28-19-713d, the following:
>
> (1) 0.26 pounds per million British thermal units (lbs/ MMBtu) for unit 1, a turbo wall-fired Riley Stoker boiler located at the Nearman Creek power station in Kansas City, Kansas; and
>
> (2) 0.20 lbs/MMbtu for unit 2, a wall-fired Riley Stoker boiler located at the Quindaro power station in Kansas City, Kansas; and
>
> (b) from flat glass furnaces, 7.0 pounds per ton of glass produced. (Authorized by K.S.A. 2009 Supp. 65-3005; implementing K.S.A. 65-3010; effective June 25, 2010.)

In the original IPM runs N1 had an emission rate of 0.46 lb/MMBtu, while in the new version of IPM the rate is 0.441 lb/MMBtu. Both of these rates are higher than permitted in the rule above. Q2 has an emission rate of 0.304 lb/MMBtu in the original IPM run, while the new IPM run has a rate of 0.281 lb/MMBtu. Both of these rates are higher than permitted in the rule above. KDHE recommends a rate of 0.26 lb/MMBtu for N1 and a rate of 0.20 lb/MMBtu for Q2 for the 2012 modeling. Using total heat input values in the new 2012 IPM runs of 13,801,240 MMBtu for N1 and 7,146,396 MMBtu for Q2 gives emissions reductions of 1290 tons and 289 tons, respectively. While the N1 reductions are not required by Jan 1, 2012, they will come into effect during the 2012 ozone season and KDHE believes they should be accounted for.

In sum, these are very significant reductions in overall NO_x emissions that have not been properly accounted for, and if counted, would likely remove the currently modeled Kansas "linkage" with Dallas, TX monitors for ozone. In addition, the NO_x and SO_2 reductions that have not been accounted for will also reduce the modeled Kansas contribution to $PM_{2.5}$ in all areas of the country.

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Timeframe for Controls

Kansas is in the unique situation that several of our EGUs are slated for installation of low NO_x burners (LNBs) as part of the proposed Transport Rule to meet statewide budgets. The timing for these installations as laid out in the rule is very aggressive, and KDHE believes likely unattainable without disruption of service. In the TSD discussing installation timing, EPA provides several examples where engineering analyses and retrofits are completed in a short time window (see http://www.epa.gov/airquality/transport/pdfs/TSD_Installation_timing_for_LNBs_07-6-10.pdf). Unfortunately, not all EGU units are the same and each brings its own unique challenges in design, engineering, and retrofitting controls. Making the assumption that all units required to install LNBs in the state could perform the retrofit in a six-month time window because it has been done at several sources elsewhere is not real-world reality, and in fact it is likely the exception rather than the rule that LNB retrofits are completed in this timeframe. Several of the Kansas units that would be looking at retrofits are co-located or operated by the same company, and could not be retrofitted at the same time for demand reliability reasons even if the design and engineering could be performed in this timeframe. In reality it is also unlikely LNB retrofits for these units can be designed and installed in a six-month window if all the variables unique to Kansas generators are factored in. KDHE strongly believes this portion of the rule is unattainable for Kansas sources. KDHE recommends language requiring LNB controls be installed as expeditiously as practicable, allowing for a more reasonable timeframe beyond the beginning of 2012.

Allocations

KDHE is unsure how the revised IPM data in the NODA might impact allocations. It appears allocations will likely change to reflect updated utility data. Rather than comment on an unknown, KDHE would just point out the fact that there are currently several Kansas units listed in the proposed rule that have an ozone season allocation—but have no annual allocation. KDHE recommends this either be further explained or corrected. KDHE also recommends that the state be responsible for determining unit-level allocations after the EPA-derived state budget is finalized.

Other Technical Issues

EPA assessment tool
The approach EPA uses to assess the effect NO_x reductions will have on downwind ozone is fundamentally flawed. The use of an assessment tool that assumes a linear relationship between the reduction in an upwind state's NO_x emissions and that state's contribution to downwind ozone levels is flawed. The production of ozone is well understood to be a nonlinear process, thus the need to perform photochemical modeling that takes into account many of the nonlinear variables affecting ozone production.

This assessment tool, as described by EPA in the proposed rule and TSD, also does not differentiate between emissions reductions of low-level sources and elevated sources of NO_x. For transport at large distances, the impacts of elevated sources versus low-level sources are likely different for varying reasons, including plume chemistry and physical location both in the

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vertical layer of the atmosphere and with the source-receptor relationship. Again, this is another nonlinear problem that should not be assumed to be linear in an assessment tool. While this flawed approach does not appear to directly impact the initial "linkage" contribution assessment, it does potentially impact other conclusions drawn from this tool's use.

KDHE understands the need for a tool that can conveniently be used for multiple scenarios; however, using a tool with fundamental flaws in the basic underlying assumption for the pollutants of concern is troublesome to KDHE. KDHE recommends a tool that can better account for a response to emissions changes, possibly even the same tool but modified to better account for a state's unique characteristics as identified by photochemical modeling. So, rather than assuming a linear response to all emissions reductions for all states, perhaps CAMx could be used to inform a tool that would have varying responses to emissions changes based on source receptor proximity, type of source reduction, etc., while retaining the needed benefits of speed in analysis.

IPM modeling (original modeling)
IPM modeling and cost curves appear to give unrealistic results for Kansas. One example is Table 1-1 in the TSD for significant contribution. This table indicates that, according to IPM modeling, annual NO_x emissions from the Kansas EGU sector would be 33,000 tons (a decrease of 37,915 tons from the assumed 2012 base case without controls) if a marginal control cost of $500/ton is applied across the state. This large decrease seems very suspect using a $500/ton marginal cost, however, since as marginal control costs are increased (i.e., there is more spending on controls), the projected annual emissions increase rather than decrease in Kansas. If Kansas EGUs can get to 33,000 tons of reductions at a marginal cost of $500/ton, at a minimum they will also get to 33,000 tons of reductions (presumably even more reductions) at a marginal cost of $1,250/ton. To have the modeled emissions increase at a marginal control cost 2.5 times higher seems unlikely even when accounting for system-wide costs and demand. Perhaps these emission results can be explained by additional load being exported out of state under the higher control cost scenarios. If this is the case, it should be included so readers can better understand these results. At a minimum, this counterintuitive result of emissions increasing with increasing marginal costs of controls needs to be better described.

IPM modeling (NODA)
It is unclear how the new IPM runs will affect the cost curves as this was not discussed in the NODA issued on September 1, 2010. KDHE recommends future rulemakings include the latest data for all aspects of the rule so stakeholders can comment on one set of data that affect various parts of the rule and the underlying decisions therein.

Model performance
Model performance is discussed for both ozone and $PM_{2.5}$ in the air quality modeling TSD. Unfortunately, this performance evaluation covers the entire modeling domain. There are many differences (emissions, meteorology, etc.) between the Midwest and the remaining eastern portion of the country that could have a significant impact on model performance. KDHE recommends a regionally based model performance assessment that would allow a reader to understand the model performance in their region of interest. This is particularly important for $PM_{2.5}$ due to the relatively large ammonia emissions in the Midwest.

As outlined in the current model performance discussion, there are some fairly large errors in sulfate and nitrate estimates. Although the model is being used in a relative sense, these errors could still impact a "linkage" assessment for a specific region, especially with the linkage assessment threshold only being 1% of the NAAQS and including all anthropogenic emissions from a state. In addition, it would be useful if $PM_{2.5}$ impacts for a state could be broken out by species component in order to answer the question, for example, is the Kansas contribution to $PM_{2.5}$ dominated by either sulfate or nitrate?

NODA

One large concern that KDHE has on the rulemaking process, and our ability to effectively comment, concerns the late arrival of additional data coupled with a virtually overwhelming amount of technical data and documentation on this proposed rule. Providing the NODA at such a late date is useful for better understanding what final emissions might be, but at the same time it makes the CAMx modeling and allocations obsolete as there is now a large disconnect between the CAMx modeling and underlying emissions along with questions on what the final allocations may look like in light of this new data. KDHE recommends in future rulemaking that EPA provides the latest inventory data and modeling concurrently so all stakeholders can effectively comment and review the entire package without wasting precious resources reviewing data that is changed midcourse in the review process.

Conclusion

KDHE is encouraged by the significant projected reductions in pollutants that will occur in upwind states as a direct result of a new Clean Air Transport Rule. Kansas sources have made significant reductions in NO_x and SO_2 in recent years, reducing the state's contribution to both transport of pollutants and reducing the exposure of Kansas' citizens to these pollutants. KDHE believes that these reductions have likely made a much more significant reduction in transport impacts in downwind nonattainment and maintenance areas than the current 2012 EPA modeling is indicating. Consistent with credits given in other states for controls and regulations in place, KDHE believes these emissions reductions that Kansas facilities have recently made should be accounted for in the EPA modeling, establishing "linkages" between Kansas emissions and downwind nonattainment. KDHE respectfully requests that the emissions modeling inventory be corrected using the latest CAMD data, along with specific KDHE recommendations, and that the CAMx "linkage" modeling be redone by EPA.

Sincerely,

Roderick L. Bremby
Secretary

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Appendix A. Historical Emissions from the EGU Sector and Proposed Transport Rule Emissions and Allocations.

Table A1. Historical NO_x emissions from Kansas EGUs > 25 MW with proposed Transport Rule emissions estimates and allocations for 2012.

NO_x emissions from Kansas >25 MW EGUs for 2005-2009 (KEI) and 2012 (IPM), and proposed rule's allowance allocations

Coal-fired units in bold font; Acid Rain Program units in blue

SourceID	Unit Name	Capacity (MW)	NO_x tons							
			2005	2006	2007	2008	2009	2012 IPM	2012 alloc.	20012 O_3
1330030	Chanute #2 Unit 14	47	2.5	8.0	18.4	10.9	12.7		0	36
1250002	Coffeyville Unit 4	38	5.8	34.7	2.4	0.2	0.2		0	0
0210002	Empire - Riverton Unit 12	170	0.0	0.0	31.01	24.32	37.84		15	7
0210002	Empire - Riverton Unit 7/39	38	531.7	634.2	579.3	449.7	433.9		451	201
0210002	Empire - Riverton Unit 8/40	50	896.5	962.0	837.0	610.5	683.4		639	220
2090008	KC BPU - Nearman Unit CT4	86	22.0	40.5	5.5	2.9	27.6		20	15
2090008	KC BPU - Nearman Unit N1	261	4,057.3	3,778.6	4,586.1	3,521.4	3,130.7	4,157.5	3,375	1,307
2090048	KC BPU - Quindaro Unit CT2	52	17.2	21.7	6.8	2.8	3.2		0	0
2090048	KC BPU - Quindaro Unit CT3	52	34.4	22.9	6.8	3.0	3.2		0	0
2090048	KC BPU - Quindaro Unit Q1	82	2,069.6	2,236.5	2,418.0	2,547.1	2,204.4	2,637.9	2,512	993
2090048	KC BPU - Quindaro Unit Q2	158	1,280.8	1,186.9	1,098.0	862.3	1,010.1	1,573.5	871	492
1070005	KCP&L - La Cygne Unit 1	893	19,985.1	26,415.0	9,675.1	2,885.0	2,791.8	25,722.7	1,969	746
1070005	KCP&L - La Cygne Unit 2	685	9,099.8	7,038.8	8,561.8	8,090.0	6,896.5	8,668.0	8,309	3,414
1210030	KCP&L - Osawatomie Unit CT1	80	1.6	2.6	2.5	0.6	0.5		1	0
0910174	KCP&L - West Gardner Unit 1	80	2.5	4.8	3.8	3.4	1.8		3	1
0910174	KCP&L - West Gardner Unit 2	80	2.6	4.6	4.0	3.1	1.8		3	1
0910174	KCP&L - West Gardner Unit 3	80	2.4	4.6	4.2	3.3	1.5		3	1
0910174	KCP&L - West Gardner Unit 4	80	2.2	4.7	4.4	2.5	1.3		2	1
1130014	McPherson #2 Unit GT1	54	1.3	11.1	7.2	1.6	5.3		0	0
1130014	McPherson #2 Unit GT2	54	1.2	3.5	1.4	0.5	0.8		0	0
1130014	McPherson #2 Unit GT3	54	1.3	8.5	3.6	1.2	3.1		0	0
1130046	McPherson #3 Unit GT1	80	8.5	15.4	25.0	9.3	8.0		10	7
1750001	MKEC - Cimarron River Unit 1	44	137.0	186.1	148.6	80.1	132.9		88	74
2010012	MKEC - Clifton Unit T1	73	51.5	52.4	53.2	0.0	0.0		0	0
0570001	MKEC - Fort Dodge Unit 4	150	375.6	372.9	440.1	365.4	348.0		383	177
0090002	MKEC - Great Bend Unit 3	75	189.8	160.5	211.0	149.5	136.8		126	96
0550026	Sunflower - Garden City Unit S2	100	45.1	149.7	52.5	100.6	102.6		0	80
0550026	Sunflower - Garden City Unit S4	70	8.0	29.8	23.7	20.8	12.4		0	0
0550026	Sunflower - Garden City Unit S5	69	3.1	8.3	13.0	11.8	3.5		0	0
0550023	Sunflower - Holcomb 1	349	4,509.8	3,878.4	4,679.4	4,514.3	4,277.7	1,073.2	4,567	1,894
0410017	Westar - Abilene Unit 1	86	11.1	20.3	34.4	12.8	47.9		0	0
1110046	Westar - Emporia Unit 1	48	0.0	0.0	0.0	12.6	30.0		0	4
1110046	Westar - Emporia Unit 2	48	0.0	0.0	0.0	16.0	32.6		0	7
1110046	Westar - Emporia Unit 3	48	0.0	0.0	0.0	17.0	32.9		0	8
1110046	Westar - Emporia Unit 4	48	0.0	0.0	0.0	16.2	31.5		0	7
1110046	Westar - Emporia Unit 5	195	0.0	0.0	0.0	6.7	8.5		0	3
1110046	Westar - Emporia Unit 6	195	0.0	0.0	0.0	0.0	7.4		0	0
1110046	Westar - Emporia Unit 7	195	0.0	0.0	0.0	0.0	7.1		0	0
1730012	Westar - Gordon Evans Unit 1	149	464.9	202.9	128.8	232.8	223.3		248	133
1730012	Westar - Gordon Evans Unit 2	383	1,473.0	982.0	908.2	614.5	808.9		583	344
1730012	Westar - Gordon Evans Unit E1CT	80	2.4	3.1	2.4	2.0	0.7		2	1
1730012	Westar - Gordon Evans Unit E2CT	80	2.5	4.1	3.1	2.4	0.6		2	1
1730012	Westar - Gordon Evans Unit E3CT	154	4.1	10.6	7.5	9.9	5.4		8	2
1550033	Westar - Hutchinson Unit BLR04	175	396.1	167.6	233.6	381.3	204.3		343	194
1550033	Westar - Hutchinson Unit CT1	54	3.9	3.9	15.5	6.5	0.9		0	0
1550033	Westar - Hutchinson Unit CT2	54	2.6	6.8	6.7	3.0	1.0		0	0
1550033	Westar - Hutchinson Unit CT3	54	4.1	6.1	14.5	4.4	1.4		0	0
1550033	Westar - Hutchinson Unit CT4	77	0.0	3.9	1.4	0.3	0.7		0	0
1490001	Westar - Jeffrey Unit 1	720	10,977.5	9,327.9	12,824.3	5,160.5	4,687.7	10,238.6	4,327	1,618
1490001	Westar - Jeffrey Unit 2	720	10,714.8	8,968.8	10,093.3	10,405.2	8,106.0	8,930.8	9,911	3,823
1490001	Westar - Jeffrey Unit 3	720	10,882.2	4,351.2	3,938.8	4,252.6	4,416.3	3,833.9	3,902	1,768
0450014	Westar - Lawrence Unit 3	61	722.0	504.0	563.8	696.1	545.9	73.9	682	300
0450014	Westar - Lawrence Unit 4	135	1,831.6	1,646.3	1,764.4	1,271.3	1,347.2	485.4	1,256	486
0450014	Westar - Lawrence Unit 5	448	2,597.6	2,521.0	2,318.0	2,348.5	2,108.0	1,619.9	2,534	1,116
1730014	Westar - Murray Gill Unit 1	43	2.0	10.3	3.1	7.4	6.7		0	6
1730014	Westar - Murray Gill Unit 2	74	9.2	23.9	18.4	14.9	36.8		0	13
1730014	Westar - Murray Gill Unit 3	112	348.6	122.1	109.6	165.9	197.7		156	95
1730014	Westar - Murray Gill Unit 4	107	319.7	138.3	115.9	181.0	184.9		204	140
0990001	Westar - Neosho Unit 7	74	3.1	10.0	10.5	3.2	0.9		0	3
1770030	Westar - Tecumseh Unit 7/9	96	1,412.9	1,430.0	1,335.0	834.3	534.3	178.1	487	203
1770030	Westar - Tecumseh Unit 8/10	176	1,941.4	1,764.0	1,838.8	1,779.9	1,743.7	1,493.5	1,790	746
1770030	Westar - Tecumseh Unit CT1	32	0.1	3.5	0.6	0.1	0.1			
1770030	Westar - Tecumseh Unit CT2	32	0.1	3.7	0.6	0.1	0.1			
0350012	Winfield #2 Unit 4	27	1.8	1.3	1.1	4.4	4.4		0	4
	[IPM Generic Unit]							136.0		
		Totals	*87,475.4*	*79,515.2*	*69,796.3*	*52,741.8*	*47,638.8*	*70,822.9*	*49,782*	*20,788*

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Table A2. Historical SO_2 emissions from Kansas EGUs > 25 MW with proposed Transport Rule emissions estimates and allocations for 2012.

SO_2 emissions from Kansas >25 MW EGUs for 2005-2009 (KEI) and 2012 (IPM), and proposed rule's allowance allocations

Coal-fired units in bold font; Acid Rain Program units in blue

SourceID	Unit	Capacity (MW)	SO_2 tons						
			2005	2006	2007	2008	2009	2012 IPM	2012 alloc.
1330030	Chanute #2 Unit 14	47	0.0	0.0	0.1	0.1	0.1		0
1250002	Coffeyville Unit 4	38	0.0	0.1	0.0	0.0	0.0		0
0210002	Empire - Riverton Unit 12	170	0.0	0.0	0.30	0.30	0.50		0
0210002	Empire - Riverton Unit 7/39	38	2,279.6	2,410.7	2,624.0	2,234.1	1,873.2		1,791
0210002	Empire - Riverton Unit 8/40	50	2,077.4	3,403.0	4,363.0	3,321.6	3,031.6		2,931
2090008	KC BPU - Nearman Unit CT4	86	19.7	6.7	0.8	0.1	0.1		0
2090008	KC BPU - Nearman Unit N1	261	7,242.0	6,019.7	7,327.1	5,991.8	5,931.6	8,495.7	6,074
2090048	KC BPU - Quindaro Unit CT2	52	9.9	12.5	3.9	1.6	1.8		0
2090048	KC BPU - Quindaro Unit CT3	52	19.7	13.1	3.9	1.7	1.8		0
2090048	KC BPU - Quindaro Unit Q1	82	2,178.4	1,807.3	2,009.1	2,014.0	1,611.4	2,962.5	1,718
2090048	KC BPU - Quindaro Unit Q2	158	3,598.7	2,776.6	2,597.8	1,884.5	1,996.5	4,865.6	1,519
1070005	KCP&L - La Cygne Unit 1	893	6,650.6	7,565.5	4,853.2	4,335.8	5,085.6	3,750.7	4,775
1070005	KCP&L - La Cygne Unit 2	685	20,972.8	14,855.0	18,201.0	19,036.6	16,243.5	25,462.1	15,462
1210030	KCP&L - Osawatomie Unit CT1	80	0.0	0.1	0.0	0.0	0.0		0
0910174	KCP&L - West Gardner Unit 1	80	0.1	0.1	0.1	0.1	0.0		0
0910174	KCP&L - West Gardner Unit 2	80	0.1	0.1	0.1	0.1	0.0		0
0910174	KCP&L - West Gardner Unit 3	80	0.1	0.1	0.1	0.1	0.0		0
0910174	KCP&L - West Gardner Unit 4	80	0.0	0.1	0.1	0.0	0.0		0
1130014	McPherson #2 Unit GT1	54	0.2	1.6	0.0	0.0	0.0		0
1130014	McPherson #2 Unit GT2	54	0.0	0.1	0.0	0.0	0.0		0
1130014	McPherson #2 Unit GT3	54	0.2	1.2	0.0	0.0	0.0		0
1130046	McPherson #3 Unit GT1	80	2.9	5.6	0.1	0.0	0.0		0
1750001	MKEC - Cimarron River Unit 1	44	0.4	0.5	0.5	0.3	0.3		0
2010012	MKEC - Clifton Unit T1	73	6.4	1.5	0.6	0.0	0.0		0
0570001	MKEC - Fort Dodge Unit 4	150	1.0	1.0	1.6	1.5	1.5		1
0090002	MKEC - Great Bend Unit 3	75	0.3	0.4	0.6	0.4	0.4		0
0550026	Sunflower - Garden City Unit S2	100	0.1	0.3	0.1	0.2	0.2		0
0550026	Sunflower - Garden City Unit S4	70	0.0	0.1	0.0	0.0	0.0		0
0550026	Sunflower - Garden City Unit S5	69	0.0	0.0	0.0	0.0	0.0		0
0550023	Sunflower - Holcomb 1	349	1,772.2	1,153.9	1,075.6	1,955.7	1,948.3	562.7	2,045
0410017	Westar - Abilene Unit 1	86	0.1	0.2	0.4	0.1	0.5		0
1110046	Westar - Emporia Unit 1	48	0.0	0.0	0.0	0.1	0.2		0
1110046	Westar - Emporia Unit 2	48	0.0	0.0	0.0	0.1	0.2		0
1110046	Westar - Emporia Unit 3	48	0.0	0.0	0.0	0.1	0.2		0
1110046	Westar - Emporia Unit 4	48	0.0	0.0	0.0	0.1	0.2		0
1110046	Westar - Emporia Unit 5	195	0.0	0.0	0.0	0.1	0.1		0
1110046	Westar - Emporia Unit 6	195	0.0	0.0	0.0	0.0	0.1		0
1110046	Westar - Emporia Unit 7	195	0.0	0.0	0.0	0.0	0.1		0
1730012	Westar - Gordon Evans Unit 1	149	2,463.8	0.4	0.4	0.7	0.7		1
1730012	Westar - Gordon Evans Unit 2	383	3,873.8	1.0	1.4	1.1	1.5		1
1730012	Westar - Gordon Evans Unit E1CT	80	0.0	0.0	0.0	0.0	0.0		0
1730012	Westar - Gordon Evans Unit E2CT	80	0.0	0.0	0.0	0.0	0.0		0
1730012	Westar - Gordon Evans Unit E3CT	154	0.1	0.1	0.1	0.2	0.1		0
1550033	Westar - Hutchinson Unit BLR04	175	1,847.0	0.3	0.4	0.9	0.6		1
1550033	Westar - Hutchinson Unit CT1	54	0.0	0.0	0.2	0.1	0.0		0
1550033	Westar - Hutchinson Unit CT2	54	0.0	0.1	0.1	0.0	0.0		0
1550033	Westar - Hutchinson Unit CT3	54	0.0	0.1	0.2	0.0	0.0		0
1550033	Westar - Hutchinson Unit CT4	77	0.0	0.1	0.1	0.0	0.0		0
1490001	Westar - Jeffrey Unit 1	720	23,743.6	21,187.6	24,763.3	8,619.5	653.2	2,731.9	637
1490001	Westar - Jeffrey Unit 2	720	25,524.9	20,260.2	21,581.8	21,880.5	4,092.6	2,469.8	8,924
1490001	Westar - Jeffrey Unit 3	720	20,295.4	23,034.6	19,428.5	17,434.1	1,286.9	2,577.6	2,031
0450014	Westar - Lawrence Unit 3	61	1,455.6	1,101.0	1,257.5	1,281.3	1,161.6	169.2	1,153
0450014	Westar - Lawrence Unit 4	135	475.3	295.6	285.2	196.6	259.8	200.6	243
0450014	Westar - Lawrence Unit 5	448	1,830.4	1,216.0	1,005.0	1,226.3	1,350.1	2,693.1	1,242
1730014	Westar - Murray Gill Unit 1	43	0.0	0.0	0.0	0.0	0.0		0
1730014	Westar - Murray Gill Unit 2	74	15.8	0.1	0.1	0.0	0.1		0
1730014	Westar - Murray Gill Unit 3	112	1,633.0	0.3	0.3	0.4	0.6		1
1730014	Westar - Murray Gill Unit 4	107	1,297.0	0.2	0.2	0.4	0.3		0
0990001	Westar - Neosho Unit 7	74	8.1	0.0	0.0	0.0	0.0		0
1770030	Westar - Tecumseh Unit 7/9	96	2,095.9	1,625.0	1,782.0	1,666.2	1,925.9	241.7	1,960
1770030	Westar - Tecumseh Unit 8/10	176	3,127.4	2,501.3	2,620.0	2,816.1	3,100.9	2,309.1	3,041
1770030	Westar - Tecumseh Unit CT1	32	0.0	0.0	0.0	0.0	0.0		0
1770030	Westar - Tecumseh Unit CT2	32	0.0	0.0	0.0	0.0	0.0		0
0350012	Winfield #2 Unit 4	27	0.4	0.0	0.0	0.0	0.0		0
0019999	[IPM Generic Unit]							74.8	
		Totals	*136,520.5*	*111,261.4*	*115,790.8*	*95,905.9*	*51,565.6*	*59,567.1*	*55,551*

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Appendix B. SCR permit for La Cygne Unit 1

KANSAS

RODERICK L. BREMBY, SECRETARY — KATHLEEN SEBELIUS, GOVERNOR

DEPARTMENT OF HEALTH AND ENVIRONMENT

AIR EMISSION SOURCE CONSTRUCTION PERMIT

Source ID No.:	1070005
Effective Date:	November 18, 2005
Source Name:	Kansas City Power and Light – La Cygne Generating Station
SIC Code:	4911 – Electric Services
NAICS Code:	221112, Fossil fuel power generation
Source Location:	25166 East 2200 Road La Cygne, Kansas 66040
Mailing Address:	P.O. Box 418679 Kansas City, Missouri 64141-9679
Contact Person:	Dan Haas Senior Environmental Specialist Telephone Number: (816) 556-2998

This permit is issued pursuant to K.S.A. 65-3008 as amended.

Description of Activity Subject to Air Pollution Control Regulations

Kansas City Power and Light is proposing to install a selective catalyst reduction (SCR) system on Unit 1 at their La Cygne Generating Station. The SCR system will reduce the emissions of nitrogen oxides (NOx) from Unit 1.

DIVISION OF ENVIRONMENT
Bureau of Air & Radiation
Air Construction/Operating Permits & Compliance Section
CURTIS STATE OFFICE BUILDING, 1000 SW JACKSON ST., STE 310, TOPEKA, KS 66612-1366
Voice 785-296-1570 Fax 785-291-3953 http://www.kdhe.state.ks.us

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Potential emissions of oxides of nitrogen (NO_X), carbon monoxide (CO), sulfur dioxide (SO_2), lead (Pb), volatile organic carbons (VOC), and particulate matter (PM/PM-10) were evaluated as a part of the permit review process. The review has determined that the company is required to obtain a construction permit under the provisions of **K.A.R. 28-19-300 (Construction permits and approvals; applicability**) because an authorized representative of the secretary has required that permit procedures be implemented on this project under K.A.R. 28-19-300(a)(5) and the utility is requesting an operational restriction that may avoid a requirement under the federal clean air act.

Significant Applicable Air Regulations

La Cygne Unit 1 is subject to Kansas Administrative Regulations relating to air pollution control. The following air quality regulations were determined to be applicable to this source.

1. K.A.R. 28-19-31(a), Emission limitations for particulate matter for indirect heating equipment.

2. K.A.R. 28-19-31(b)(1), Opacity requirements for Indirect Heating Equipment.

Air Emission Unit Technical Specifications

The following equipment or equivalent is approved:

1. One selective catalytic reduction system, to reduce emissions of nitrogen oxides from La Cygne Generating Station Unit 1. This includes necessary modifications to the existing exhaust gas handling system and ancillary equipment for the proper operation of the SCR system.

Air Emissions Estimates from the Proposed Activity

POLLUTANT	Typical Pre-permit Emissions Tons/yr	Expected Post-permit Emissions Ton/yr
Oxides of Nitrogen (NOx)	27,059	4,059

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Air Emission Limitations

1. Particulate matter emissions from all indirect heating equipment (the boilers) at La Cygne Generating Station are limited to 0.12 pounds per million BTU. [K.A.R. 28-19-31(a)]

2. Opacity of any visible emissions from La Cygne Unit One is limited to less than 40 percent per K.A.R. 28-19-31(b).

3. Emissions of NOx from La Cygne Unit One will be limited to 0.15 pounds per million BTU calculated as a 12 month rolling average, recalculated monthly.

Performance Testing and Compliance

1. Compliance with the NOx limits on La Cygne Unit One may be demonstrated using emission data collected with the existing continuous emissions monitoring system (CEMS) required under 40 CFR Part 75.10. The monthly average emissions should be calculated by summing the hourly emission values divided by the number of hours operated in each calendar month.

2. The NOx limit on La Cygne Unit One will become effective 180 days after startup of the new selective catalytic reduction (SCR) unit. The CEMS will collect enough data to demonstrate compliance with NOx limit within 12 months after the end of the 180 day startup period.

Recordkeeping Requirements

1. Records of the monthly average NOx emissions and the 12 month rolling average NOx emissions shall be kept on site in a form suitable for inspection for a minimum of two years from the date of the record.

Reporting

1. If the 12 month rolling average NOx emissions from La Cygne Unit One exceed 0.1275 pounds per million BTU, the owner or operator shall submit a report to KDHE on a quarterly basis a report containing the calculated 12 month rolling average NOx emissions for each month in the quarter. The report shall be postmarked by the 30th day following the end of the semi-annual reporting period to which the report pertains. If the quarter contains no averages exceeding 0.1275 pounds per million BTU, the quarterly reports may be discontinued.

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Notifications

1. Notify the Air Quality Representative in the Northeast District KDHE office in Lawrence at 785-842-4600 when installation of the new equipment is complete so that an evaluation can be conducted.

2. Provide KDHE a written notification of the date of startup of the SCR control system on La Cygne Unit One. This notification should be postmarked within 30 days of the startup of the SCR system.

General Provisions

1. This document shall become void if the construction or modification has not commenced within 18 months of the effective date, or if the construction or modification is interrupted for a period of 18 months or longer.

2. A construction permit or approval must be issued by KDHE prior to commencing any construction or modification of equipment or processes which results in potential-to-emit increases equal to or greater than the thresholds specified at K.A.R. 28-19-300.

3. Upon presentation of credentials and other documents as may be required by law, representatives of the KDHE (including authorized contractors of the KDHE) shall be allowed to:

   a. enter upon the premises where a regulated facility or activity is located or conducted or where records must be kept under conditions of this document;

   b. have access to and copy, at reasonable times, any records that must be kept under conditions of this document;

   c. inspect, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this document; and

   d. sample or monitor, at reasonable times, for the purposes of assuring compliance with this document or as otherwise authorized by the Secretary of the KDHE, any substances or parameters at any location.

4. The emission unit or stationary source which is the subject of this document shall be operated in compliance with all applicable requirements of the Kansas Air Quality Act and the federal Clean Air Act.

5. This document is subject to periodic review and amendment as deemed necessary to fulfill the intent and purpose of the Kansas Air Quality Statutes and Regulations.

6. This document does not relieve the permittee of the obligation to obtain other approvals, permits, licenses, or documents of sanction which may be required by other federal, state, or local agencies.

Permit Engineer

Dana S. Morris

11/18/2005

Dana S. Morris, P.E.
Professional Environmental Engineer
Air Construction/Operating Permits & Compliance Section
Date Signed

DSM:saw
c: NEDO
C-6497

34-16

Consent Agreement Between KCP&L and KDHE

Kansas City Power & Light Company
P.O. Box 418679
Kansas City, MO 64141-9679
Source Identification Number: 1070005

CONSENT AGREEMENT

The parties hereto, the Kansas Department of Health and Environment and the Kansas City Power & Light Company, having agreed that entry of this Consent Agreement, hereinafter Agreement, is in the best interest of the parties and the public health and the environment, hereby represent and state as follows:

JURISDICTION

1. The Kansas Department of Health and Environment, hereinafter KDHE, is a duly authorized agency of the State of Kansas created by an act of the legislature.

2. The Secretary of KDHE has responsibility for air quality conservation and control of air pollution pursuant to the Kansas Air Quality Act, K.S.A. 65-3001 et seq.

3. Kansas City Power & Light Company, hereinafter KCP&L, is a Missouri Corporation registered to do business in Kansas in accordance with Kansas laws and is subject to K.S.A. 65-3001 et seq. and the regulations adopted thereunder, and is the legal and rightful owner of La Cygne Generating Station, hereinafter La Cygne.

4. Pursuant to K.S.A. 65-3005, the Secretary has authority and jurisdiction to issue this Agreement and to enforce the same. In any action by KDHE to enforce the terms of this Agreement, KCP&L agrees not to contest the authority or jurisdiction of the Secretary to issue this Agreement.

5. The terms of this Agreement shall be construed in accordance with the applicable laws of the state of Kansas and the United States.

STATEMENT OF PURPOSE

6. In entering into this Agreement, it is the mutual objective of KDHE and KCP&L to make federally enforceable the existing nitrogen oxides (NO_x) emissions limit for La Cygne Unit 1 for purposes of accurately representing the NOx emission reductions from the unit in the Proposed Transport Rule (75 FR 45210). This Agreement is not the result of any enforcement action or alleged non-compliance with any law, regulation, permit, or order.

PARTIES BOUND

7. This Agreement shall apply to and be binding upon the parties, their agents, successors, and assigns and upon all persons, contractors, and consultants acting under or for either KDHE or KCP&L or both. Notwithstanding the terms of any contract, KCP&L is responsible for compliance with this Agreement and for insuring that its contractors and agents comply with this Agreement.

8. The parties agree to undertake all actions required of them by the terms and conditions of this Agreement.

9. The activities conducted under this Agreement are subject to approval by KDHE. KCP&L shall make all reasonable efforts to provide all necessary information consistent with this Agreement requested by KDHE.

LIABILITY

10. Nothing in this Agreement shall be considered an admission of any fact or acknowledgment of any liability by any party, nor shall anything in this Agreement be considered an admission of any fact or acknowledgment of any violation of any law, regulation, permit or order. Neither the State of Kansas, nor any agency thereof, shall be held out as a party of any contract entered into by KCP&L in carrying out activities pursuant to this Agreement.

FINDINGS OF FACTS

11. La Cygne Unit 1 began operation in 1973, and is a cyclone-fired, wet bottom boiler that uses coal as the primary fuel.

12. KDHE issued a construction permit to KCP&L, dated November 18, 2005, to allow for installation of a selective catalytic reduction (SCR) system on La Cygne Unit 1 to reduce emissions of NO_x. The construction permit limits NO_x emissions from Unit 1 to 0.15 pounds per million British thermal units (lbs/mmBtu), calculated as a 12 month rolling average, recalculated monthly.

13. In accordance with the construction permit, the NO_x emissions limit became effective 180 days after startup of the SCR system. The SCR system on Unit 1 was operational on May 29, 2007, and the NOx emissions limit became effective on or about December 2007.

AGREEMENT & COMPLIANCE PLAN

14. The terms of this Agreement constitute an agreement pursuant to K.S.A. 65-3005 to make the NO_x emissions limit at La Cygne Unit 1 federally enforceable by incorporating this Agreement into the Kansas State Implementation Plan. Nothing in this Agreement shall constitute or be construed as a release for any claim or cause of action for any New Source Review or New Source Performance Standards liability under the Clean Air Act.

15. KCP&L agrees that emissions of NO_x from La Cygne Unit 1 will be limited to 0.15 lbs/mmBtu, calculated as a 12-month rolling average, recalculated monthly. This limit includes emissions emitted during periods of startup, shutdown and malfunction. KCP&L agrees to minimize excess emissions of air pollutants during startup, shutdown and malfunction situations by committing to the following actions:

A. During startup, pollution control equipment will be activated as soon as practical,

within the manufacturer's recommendations or following best engineering practices in the industry;

B. During shutdown, pollution control equipment will be operated as long as practical, within the manufacturer's recommendations or following best engineering practices in the industry;

C. Good combustion and operating practices will be utilized to minimize excess air pollutant emissions during all startup, shutdown and malfunction conditions.

16. KCP&L agrees to perform continuous emissions monitoring and compliance verification procedures in accordance with 40 CFR Part 75.

17. The emissions limit in this Agreement will be incorporated into any future operating permits issued to KCP&L for La Cygne Unit 1.

18. KDHE will incorporate this Agreement into a revision of the Kansas State Implementation Plan, and will formally submit it to EPA Region 7 for review and approval in accordance with 40 CFR Part 51.

CONCLUSIONS OF LAW

19. KCP&L is a person within the meaning of K.S.A. 65-3002(j).

20. K.S.A. 65-3003 provides that the responsibility for air quality conservation and control of air pollution is placed with the Secretary of Health and Environment and that the Secretary shall administer the Kansas Air Quality Act through the Division of Environment.

21. This is an agreement pursuant to K.S.A. 65-3005.

22. K.S.A. 65-3005(a)(3) provides the Secretary the power to issue orders, permits and approvals as may be necessary to effectuate the purposes of the Kansas Air Quality Act and enforce the same by all appropriate administrative and judicial proceedings.

23. K.S.A. 65-3005(a)(16) provides the Secretary the power to enter into contracts and agreements with other state agencies or subdivisions, local governments, other states, interstate agencies, the federal government or its agencies or private entities as is necessary to accomplish the purposes of the Kansas Air Quality Act.

24. K.S.A. 65-3011 provides the Secretary the power to issue an order to correct a violation of any provision of any approval, permit or compliance plan. The Secretary may issue an order finding such person in violation of the Kansas Air Quality Act and direct the person to take such action as necessary to correct the violation.

DISPUTE RESOLUTION

25. The parties recognize that a dispute may arise between them regarding implementation of the action to be taken as herein set forth or other terms or provisions of this Agreement.

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A. If such dispute arises, the parties will endeavor to settle it by informal negotiations between themselves. If the parties cannot resolve the issue informally within a reasonable period of time, either of the parties may notify the other in writing stating its position with regard to the dispute and the reasons therefore. A party receiving such a notice of dispute will respond in writing within ten (10) days stating its position. KDHE or KCP&L shall then have an additional ten (10) day period or such longer time as the parties agree to respond. If the parties are still unable to reach an agreement, the matter shall be referred to the KDHE Director of the Division of Environment, who shall decide the matter and provide a written statement of his decision.

B. This dispute resolution procedure shall not preclude any party from having direct recourse to court if otherwise available under the Kansas Judicial Review Act, K.S.A. 77-601 et seq., or other applicable law.

OTHER CLAIMS AND PARTIES

26. Nothing in this Agreement shall constitute or be construed as a release for any claim, cause of action or demand in law or equity against any person, firm, partnership, or corporation not a signatory to this Agreement for any liability it may have arising out of or relating in any way to this Agreement.

EFFECTIVE DATE, TERMINATION

27. This Agreement shall become effective when signed by the Secretary of the Department of Health and Environment.

28. This Agreement will be terminated at such time that it is superseded by a future agreement, regulation, or other enforceable document that contains equivalent or more stringent emission limits. KDHE will provide written notice to KCP&L of said termination. Such notice shall not be unreasonably withheld.

AUTHORIZATION OF SIGNATORIES TO EXECUTE THE AGREEMENT AND BIND THE PARTIES

29. The parties hereto have affixed their signatures on the dates inserted below to acknowledge their agreement to this Agreement. The signatories to this Agreement certify that they are authorized to execute and legally bind the parties they represent to this Agreement.

Roderick L. Bremby
Secretary
Kansas Department of Health and Environment

09/27/2010
Date

Scott Heidtbrink
Senior Vice President-Supply
Kansas City Power and Light Company

9/22/10
Date

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KANSAS

DEPARTMENT OF HEALTH
AND ENVIRONMENT
Division of Environment

Mark Parkinson, Governor
Roderick L. Bremby, Secretary

www.kdheks.gov

October 1, 2010

Attention Docket ID No. EPA-HQ-OAR-2010-0107
U.S. Environmental Protection Agency, EPA West (Air Docket)
1200 Pennsylvania Avenue, NW
Mail Code: 6102T
Washington, DC 20460

To Whom It May Concern:

On August 12, 2010, the U.S. Environmental Protection Agency (EPA) issued a proposed finding of substantial inadequacy and SIP Call under Clean Air Act section 110(k)(5). Specifically, EPA proposed that 13 states, including Kansas, do not have a State Implementation Plan (SIP) that applies Prevention of Significant Deterioration (PSD) requirements to greenhouse gas (GHG) sources. This SIP Call proposal was published in the *Federal Register* on September 2, 2010 (75 FR 53892).

In a companion proposal also published on September 2, 2010 (75 FR 53883), EPA proposes a Federal Implementation Plan (FIP) for the 13 states identified in the proposed SIP Call. EPA states its "goal is to have each and every affected State have in place the necessary permitting authorities by the time businesses seeking construction permits need to have their applications processed and the permits issued—and to achieve that outcome by means of engaging with the States directly through a concerted process of consultation and support" (75 FR 53890).

To that end, EPA has partnered with the National Association of Clean Air Agencies (NACAA) on a number of conference calls and webinars in which KDHE staff has actively participated. KDHE staff has also had numerous conversations with EPA Region 7 staff. We are all working hard to chart a path forward, but the nature of a proposed rule has led to sometimes contradictory messages from EPA regarding how these proposed SIP/FIP rules will be implemented.

The proposed SIP Call rule includes a request that specific information be submitted by the 13 states (as identified in Table IV-1, 75 FR 53899) that do not appear to apply PSD requirements to GHG sources. The information requests (75 FR 53901) are listed verbatim below, with each followed by Kansas' comments and/or responses. These responses are Kansas' best efforts to clearly outline the path Kansas intends to take to implement EPA's proposed SIP/FIP rules. Kansas' comments are offered only on the rules as proposed. If the final rules differ substantially from the proposed rules, we suggest that EPA stay the proposed

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JOINT COMMITTEE ON ENERGY AND ENVIRONMENTAL POLICY
DATE: 10/8/10
ATTACHMENT 35

rule. Kansas' primary objective in this effort is to have in place the necessary permitting authority to avoid a moratorium and/or ban on construction and to eliminate any period of time when GHG permits cannot be issued by KDHE.

(a) Confirm, with citations and a copy of the relevant language, that the SIP PSD applicability provisions do not explicitly include GHG sources;

The currently approved Kansas PSD SIP does not contain applicability provisions that explicitly include GHG sources. Please see the attached copy of Kansas' PSD regulation, Kansas Administrative Regulation (K.A.R.) 28-19-350, which adopts by reference the federal PSD requirements at 40 C.F.R. 52.21 (with certain exceptions) to July 1, 2007.

(b) Identify and provide a copy of any provision that specifically precludes PSD applicability for GHG sources;

There are no provisions that specifically preclude PSD applicability for GHG sources. However, Kansas Statutes Annotated (K.S.A.) 2009 Supp. 65-3005(b)(1) limits the rulemaking authority of the Secretary of the Kansas Department of Health and Environment (KDHE) such that regulations "shall not be any more stringent, restrictive or expansive than those required under the federal clean air act, as amended, nor shall the rules and regulations be enforced in any area of the state prior to the time required by the federal clean air act." A copy of K.S.A. 2009 Supp. 65-3005 is attached.

(c) Identify and provide a copy of any provision of State constitution or other law, including the SIP, that may be read to limit the applicability of the PSD program to pollutants identified at a certain point in time, and therefore not to GHGs.

Article 2 of the Constitution of the State of Kansas declares the legislative power is vested in the Kansas House of Representatives and Senate. The legislative branch enacts statutes that specify actions or limits state agencies must abide by when promulgating rules and regulations. By way of Kansas Attorney General Opinion No. 77-379, a state agency may only adopt by reference federal rules or regulations that are "known and in existence at the time of adoption by reference." Therefore, "open-ended" or "forward" adoption by reference of the federal PSD regulations (40 C.F.R. 52.21) is not allowed in Kansas; as a result, the applicability of the PSD program to pollutants is currently limited to those currently identified at the point in time of the current regulation (i.e., July 1, 2007).

(d) Indicate, with citations and a copy of the relevant language, if any, whether the SIP includes general authority for the State to issue PSD permits that meet EPA requirements;

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K.S.A. 65-3008 contains general authority for Kansas to issue a permit to a stationary source that emits air contaminants. "Air contaminant" is defined in K.S.A. 65-3002, as amended.

K.A.R. 28-19-350 implements the federal New Source Review PSD program via adoption by reference of the majority of 40 C.F.R. 52.21. However, since K.A.R. 28-19-350 only adopts by reference 40 C.F.R. 52.21 as in effect on July 1, 2007, Kansas does not currently have the authority to address GHG emissions when issuing PSD permits.

(e) Indicate, with citations and a copy of the relevant language, any other provisions of the SIP or State law that may bear on the applicability of the PSD program to GHG-emitting sources.

See previous answers, particularly paragraphs (c) and (d).

(f) Indicate the State's interpretation as to whether the SIP, read as a whole, does or does not apply the PSD program to GHG sources or authorize the State to issue PSD permits for GHG sources that meet EPA requirements. This statement should be made by the commissioner or general counsel of the State environmental agency, or by the counterpart at the local or tribal level, or by the State Attorney General.

Please see the attached statement from KDHE's Chief Legal Counsel.

(g) If the SIP, read as a whole, does not apply the PSD program to GHG sources or authorize the issuance of permits to GHG sources, indicate whether the State plans to develop adequate authority to apply the PSD program to GHG sources and to submit it to EPA as a SIP revision by December 1, 2010, which is shortly before the date on which, as discussed below, EPA intends to finalize its finding of inadequacy and finalize the SIP Call.

To implement the Tailoring Rule for Kansas, KDHE is proposing to adopt by reference 40 C.F.R. 52.21 and Subpart I of 40 C.F.R. Part 51 for PSD permitting, and adopt and update the definitions from 40 C.F.R. 70.2 for Title V permitting. This update will only include revisions needed for adopting the final Tailoring Rule as published in the *Federal Register* on June 3, 2010 (75 FR 31606-31607). A public hearing on the proposed Kansas administrative regulations and SIP revision will be held on October 26, 2010. KDHE intends to publish the final rules in November 2010 with an implementation date of January 2, 2011. This will align state and federal regulations and facilitate SIP approval.

Kansas submitted a draft proposed SIP revision to EPA for parallel processing on October 1, 2010. This submittal contains all the necessary elements for EPA to commence review in order to propose approval of Kansas' SIP revision *except* for the final published state regulations that adopt the federal requirements by reference. The

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final, fully-adopted rule will be submitted as soon as possible after the public comment period closes on October 26, 2010.

The primary objective is that sources in Kansas are able to obtain necessary permits from KDHE without delay. Kansas' path forward relies heavily on several key concepts described in the preambles of the proposed SIP/FIP rules, including parallel processing, expedited SIP approval, and the FIP as a "backstop" (75 FR 53901).

In an effort to intercept a finding of SIP inadequacy or a SIP Call, Kansas will develop regulations by December 1, 2010, to allow KDHE to issue PSD permits for GHGs and to avoid a construction ban. Kansas' regulations will simply adopt by reference the revisions to 40 C.F.R. 52.21 and 40 C.F.R. 70.2 as promulgated in the Tailoring Rule published on June 3, 2010. With the simplicity of Kansas' proposed SIP revision, its parallel processing request, the imperative to minimize the period when sources will be subject to PSD without an available PSD permitting authority, and EPA's goal that PSD permitting authority reside in the states, Kansas requests EPA to take action quickly on this proposed SIP revision, no later than January 2, 2011. This timeframe is reasonable (75 FR 53901) and sensibly avoids the imposition of a permitting moratorium of potentially uncertain duration.

If, however, EPA is unable to act quickly on this request and Kansas remains on the "presumptive SIP Call list," Kansas requests the shortest possible SIP revision submittal deadline as stated in the proposed rule at 75 FR 53901, which is either December 22, 2010, or three weeks from the date of signature of the final rule.

If EPA cannot assure Kansas that the SIP revision, if approvable, *will* be approved by January 2, 2011, the state does not object to EPA's immediately issuing a finding of failure to submit a required SIP revision and immediately thereafter promulgating a FIP for Kansas. If this is the case, Kansas requests immediate delegation of federal PSD permitting authority to the Kansas Department of Health and Environment to ensure there is no permitting moratorium and construction ban.

If EPA approves the SIP revision before January 2, 2011, a construction ban or permitting moratorium can be avoided and a Federal Implementation Plan need not be issued to Kansas.. We look forward to resolving this matter as soon as possible.

Sincerely,

Roderick L. Bremby
Secretary

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cc: Lisa Jackson, Administrator
Environmental Protection Agency

Karl Brooks, Regional Administrator
Environmental Protection Agency, Region 7

John W. Mitchell, Director of the Division of Environment
Kansas Department of Health and Environment

Senator Vicki Schmidt, Chair
Joint Committee on Administrative Rules and Regulations

Senator Carolyn McGinn, Chair
Joint Committee on Energy and Environmental Policy

Mark Smith, Air Permitting and Compliance Branch
Environmental Protection Agency, Region 7

Attachments

- K.A.R. 28-19-350
- K.S.A. 65-3002
- K.S.A. 65-3005
- K.S.A 65-3008
- Statement from KDHE's Chief Legal Counsel
- Kansas Department of Administration Policy and Procedure Manual
- Attorney General Opinion No. 77-369
- 2010 Session Laws of Kansas, Chapter 95

State of Kansas

Department of Health and Environment

Permanent Administrative Regulations

Article 19.—AMBIENT AIR QUALITY STANDARDS AND AIR POLLUTION CONTROL

28-19-350. Prevention of significant deterioration (PSD) of air quality. (a) PSD requirements. The requirements of this regulation shall apply to the construction of major stationary sources and major modifications of stationary sources as defined in 40 C.F.R. 52.21 in areas of the state designated as attainment areas or unclassified areas for any pollutant under the procedures prescribed by section 107(d) of the federal clean air act, 42 U.S.C. 7407(d).

(b) Adoption by reference; exceptions.

(1) 40 C.F.R. 52.21, as revised on July 1, 2007, is adopted by reference, except as specified in paragraphs (b)(2) and (3).

(2) The following subsections of the federal regulation adopted in paragraph (b)(1) are excluded from adoption:

(A) Plan disapproval, 52.21(a)(1);

(B) stack heights, 52.21(h);

(C) air quality analysis, 52.21(m)(1)(v);

(D) visibility monitoring, 52.21(o)(3);

(E) public participation, 52.21(q);

(F) environmental impact statements, 52.21(s);

(G) disputed permits or redesignations, 52.21(t);

(H) delegation of authority, 52.21(u); and

(I) permit rescission, 52.21(w).

(3) The following subsections of the federal regulation adopted in paragraph (b)(1), which are subject to a federal court order of stay or remand or have been vacated, are excluded from adoption:

(A) Routine maintenance, repair, and replacement:

(i) The second sentence of 52.21(b)(2)(iii)(a);

(ii) 52.21(b)(55-58); and

(iii) 52.21(cc); and

(B) recordkeeping requirements for projected actual emissions: the clause "in circumstances where there is a reasonable possibility that a project that is not a part of a major modification may result in a significant emissions increase" in 52.21(r)(6).

(c) Provisions adopted by reference; term usage. When used in any provision adopted from 40 C.F.R. 52.21, each reference to "administrator" shall mean the "secretary of health and environment or an authorized representative of the secretary," except for the following:

(1) In subsections 52.21(b)(3)(iii)(a) and 52.21 (b)(48)(ii), "administrator" shall mean both the "secretary of health and environment" and the "administrator of USEPA."

(2) In subsections 52.21(b)(17), 52.21(b)(37)(i), 52.21(b)(43), 52.21(b)(48)(ii)(c), 52.21(b)(50)(i), 52.21(b)(51), 52.21(g), 52.21(i)(6-8), 52.21(l)(2), and 52.21(m)(1)(vii-viii), "administrator" shall mean only the "administrator of USEPA."

(d) Internal references. The following federal regulations and appendices as revised on July 1, 2007, which are referred to in the federal regulation adopted in paragraph (b)(1), are hereby adopted by reference:

(1) 40 C.F.R. part 51, subpart I; and

(2) 40 C.F.R. part 51, appendices S and W.

(e) Definitions. For the purposes of this regulation, the following definitions shall apply:

(1) "Act" shall mean the federal clean air act, 42 U.S.C. 7401 et seq.

(2) "Class I, II or III area" shall mean a classification assigned to any area of the state under the provisions of sections 162 and 164 of the act, 42 U.S.C. 7472 and 7474, and amendments thereto.

(3) "State" shall mean the state of Kansas, unless the context clearly indicates otherwise.

(f) Ambient air ceiling protection. In relation to ambient air ceilings, the following requirements shall apply:

(1) Except as stated in paragraph (f)(2) of this regulation, a permit shall not be issued for any new major stationary source or major modification as defined in 40 C.F.R. 52.21(b) if the source or modification will be located in an attainment area or an unclassifiable area for any national ambient air quality standard and if the source or modification would cause or contribute to a violation of any national ambient air quality standard. A major source or major modification shall be considered to cause or contribute to a violation of a national ambient air quality standard if the air quality impact of the source or modification would exceed the following levels at any locality that does not or would not meet the applicable national standard:

	Averaging Time				
Pollutant	Annual	24 hrs.	8 hrs.	3 hrs.	1 hr.
Sulphur dioxide	1.0 $\mu g/m^3$	5 $\mu g/m^3$	-------	25 $\mu g/m^3$	-------
PM_{10}	1.0 $\mu g/m^3$	5 $\mu g/m^3$	-------	-------	-------
Nitrogen dioxide	1.0 $\mu g/m^3$	-------	-------	-------	-------
Carbon monoxide	-------	-------	0.5 mg/m^3	-------	2 mg/m^3

(2) A permit may be granted for a major stationary source or major modification as identified in paragraph (f)(1) of this regulation if the impact of the major stationary source's or major modification's emissions upon air quality is reduced by a sufficient amount to compensate for any adverse impact at the location where the major source or modification would otherwise cause or contribute to a violation of any national ambient air quality standard. Subsection (f) shall not apply to a major stationary source or major modification with respect to a particular pollutant if the owner or operator demonstrates that the source is located in an area that has been identified as not meeting either the national primary or secondary ambient air quality standard for that particular pollutant.

(g) Stack height requirements. K.A.R. 28-19-18 through K.A.R. 28-19-18f, regarding stack height requirements, shall apply to the sources subject to this regulation.

(h) Application required. Each application for a PSD permit shall be submitted by the owner or operator on the forms provided or approved by the department. K.A.R. 28-19-300 through K.A.R. 28-19-304, regarding construction permit and approval requirements, shall apply to the sources subject to this regulation.

(i) Impact on federal class I areas; notification required. If the emissions from any proposed major stationary source or major modification subject to this regulation

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will affect any air quality-related values in any federal class I area, a copy of the permit application for the source or modification shall be transmitted by the secretary or an authorized representative of the secretary to the administrator of USEPA through the appropriate regional office. The administrator, through the appropriate regional office, shall also be notified of every action taken concerning the application.

(j) Permit suspension or revocation. Any permit issued under this regulation may be suspended or revoked by the secretary upon a finding that the owner or operator has failed to comply with any requirement specified in the permit or with any other statutory or regulatory requirement. This subsection shall not be interpreted to preclude any other remedy provided by law to the secretary.

(k) Public participation requirements. In addition to the requirements of K.A.R. 28-19-204, the following public participation requirements shall be met before issuance of the permit:

(1) The public notice shall include the following:

(A) A statement specifying the portion of the applicable maximum allowable increment that is expected to be consumed by the source or modification; and

(B) a statement that the federal land manager of any adversely impacted federal class I area has the opportunity to provide the secretary with a demonstration that the emissions from the proposed source or modification will have an adverse impact on air quality-related values in the federal class I area.

(2) A copy of the public notice shall be mailed to the following:

(A) The applicant;

(B) the administrator of USEPA through the appropriate regional office;

(C) any state or local air pollution control agency having jurisdiction in the air quality control region in which the new or modified installation will be located;

(D) the chief executives of the city and county where the source will be located;

(E) any comprehensive regional land use planning agency having jurisdiction where the source will be located; and

(F) any state, federal land manager, or Indian governing body whose lands will be affected by emissions from the new construction or modification.

(3) In addition to those materials required to be available for public review at the appropriate district office or local agency, a summary analysis and discussion of those materials as they relate to establishing compliance with the requirements of this regulation shall be made available for public review.

(4) Copies of all comments received and the written determination of the secretary shall be made available for public inspection at the appropriate district office or local agency. (Authorized by K.S.A. 2008 Supp. 65-3005, as amended by L. 2009, ch. 141, sec. 23; implementing K.S.A. 2008 Supp. 65-3005, as amended by L. 2009, ch. 141, sec. 23 and K.S.A. 65-3008; effective Nov. 22, 2002; amended June 30, 2006; amended Oct. 23, 2009.)

Roderick L. Bremby
Secretary of Health
and Environment

Doc. No. 037585

State of Kansas

Board of Pharmacy

Permanent Administrative Regulations

Article 1.—REGISTRATION AND EXAMINATION OF PHARMACISTS

68-1-1h. Foreign pharmacy graduate equivalency examination. In addition to meeting the requirements of K.A.R. 68-1-1f, each foreign applicant shall meet the following requirements for licensure under the pharmacy act of the state of Kansas:

(a) Pass the foreign pharmacy graduate equivalency examination (FPGEE) with a score of at least 75;

(b) obtain foreign pharmacy graduate examination committee (FPGEC) certification from the national association of boards of pharmacy (NABP); and

(c) submit a copy of the FPGEC certificate to the board. (Authorized by and implementing K.S.A. 65-1631; effective Oct. 23, 2009.)

68-1-3a. Qualifying pharmaceutical experience. (a) Pharmaceutical experience that qualifies as one year of experience shall consist of 1,500 clock-hours as a pharmacy student or registered intern while being supervised by a preceptor. A preceptor may supervise at any time no more than two individuals who are pharmacy students or interns. All hours worked when the pharmacy student or intern is in regular attendance at an approved school of pharmacy and during vacation times and other times when the pharmacy student or intern is enrolled but not in regular attendance at an approved school of pharmacy may be counted as qualified hours. However, not more than 60 hours of work shall be acquired in any one week.

(b) No time may accrue to a pharmacy student before acceptance in an approved school of pharmacy or before being registered as an intern with the board. However, any foreign pharmacy graduate who has passed equivalent examinations as specified in K.A.R. 68-1-1f and K.A.R. 68-1-1h may apply for registration as an intern.

(c) Once registered as an intern, the intern shall complete all required hours within six years.

(d) Reciprocity shall not be denied to any applicant who is otherwise qualified and who meets either of the following conditions:

(1) Has met the internship requirements of the state from which the applicant is reciprocating; or

(2) has at least one year of experience as a registered pharmacist. (Authorized by K.S.A. 65-1630; implementing K.S.A. 65-1631; effective, E-76-31, Aug. 11, 1975; effective May 1, 1976; amended May 1, 1983; amended May 1, 1985; amended May 31, 2002; amended Jan. 14, 2005; amended Oct. 23, 2009.)

Article 2.—DRUGSTORES

68-2-22. Electronic prescription transmission. (a) Each prescription drug order transmitted electronically shall be issued for a legitimate medical purpose by a pre-

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licensed chiropractor, a licensed dentist or licensed optometrist in appropriately related cases. Physical therapists may initiate physical therapy treatment with the approval of a practitioner of the healing arts duly licensed under the laws of another state and may provide such treatment based upon an order by such practitioner in any setting in which physical therapists would be authorized to provide such treatment with the approval of a physician licensed by the board, notwithstanding any provisions of the Kansas healing arts act or any rules and regulations adopted by the board thereunder.

(b) Physical therapists may evaluate and treat a patient for no more than 30 consecutive calendar days without a referral under the following conditions: (1) The patient has previously been referred to a physical therapist for physical therapy services by a person authorized by this section to approve treatment; (2) the patient's referral for physical therapy was made within one year from the date a physical therapist implements a program of physical therapy treatment without a referral; (3) the physical therapy being provided to the patient without referral is for the same injury, disease or condition as indicated in the referral for such previous injury, disease or condition; and (4) the physical therapist transmits to the physician or other practitioner identified by the patient a copy of the initial evaluation no later than five business days after treatment commences. Treatment for more than 30 consecutive calendar days of such patient shall only be upon the approval of a person authorized by this section to approve treatment.

(c) Physical therapists may provide, without a referral, services which do not constitute treatment for a specific condition, disease or injury to: (1) Employees solely for the purpose of education and instruction related to workplace injury prevention; or (2) the public for the purpose of fitness, health promotion and education.

(d) Physical therapists may provide services without a referral to special education students who need physical therapy services to fulfill the provisions of their individualized education plan (IEP) or individualized family service plan (IFSP).

History: L. 2007, ch. 177, § 21; May 17.

65-2922. Title of the act. The provisions of K.S.A. 65-2901 through 65-2921, and amendments thereto, shall be known and may be cited as the physical therapy practice act.

History: L. 2007, ch. 177, § 22; May 17.

Article 30.—AIR QUALITY CONTROL

65-3002. Definitions. As used in this act, unless the context clearly requires otherwise:

(a) "Air contaminant" means dust, fumes, smoke, other particulate matter, vapor, gas, odorous substances, or any combination thereof, but not including water vapor or steam condensate.

(b) "Air contamination" means the presence in the outdoor atmosphere of one or more air contaminants.

(c) "Air pollution" means the presence in the outdoor atmosphere of one or more air contaminants in such quantities and duration as is, or tends significantly to be, injurious to human health or welfare, animal or plant life, or property, or would unreasonably interfere with the enjoyment of life or property, or would contribute to the formation of regional haze.

(d) "Alter" means any physical change in, or change in the method of operation of, an air contaminant emission stationary source which increases the amount of any regulated air pollutant emitted by such source or which results in the emission of any regulated air pollutant not previously emitted.

(e) "Emission" means a release into the outdoor atmosphere of air contaminants.

(f) "Deciview" means an atmospheric haze index that expresses changes in visibility conditions as defined in 40 C.F.R. 51.301 as in effect on July 1, 2005.

(g) "Facility" means any building, structure, machine, equipment, device or installation (or group of buildings, structures, machines, equipment, devices or installations), whether temporary or permanent, located on one or more contiguous or adjacent properties and under common control of the same person (or persons under common control). Such term shall not include locomotives, diesel trucks or truck tractors unless otherwise required by the federal clean air act, as amended November 1990.

(h) "Modify" or "modification," when used in conjunction with an approval or permit action, means an amendment to an existing approval or permit initiated by the permittee. When used to describe a change in any air contaminant emis-

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stationary source, "modify" shall have the same meaning as the term "alter."

(i) "Permittee" means the holder of an approval or the holder of a permit and includes both the owner and the operator of any approved or permitted air contaminant emission source.

(j) "Person" means any individual, partnership, firm, association, municipality, public or private corporation, subdivision or agency of the state or federal government, trust, estate or any other legal entity.

(k) "Regional haze" means visibility impairment, measured in deciviews, occurring over a large geographic area caused by the cumulative emissions of gaseous and particulate air contaminants from numerous sources.

(l) "Reopen" means to seek an amendment to an existing approval or permit initiated by any person other than the permittee.

(m) "Secretary" means the secretary of health and environment.

(n) "Stationary source" means any building, structure, facility or installation which emits or may emit any air contaminant.

History: L. 1967, ch. 347, § 2; L. 1970, ch. 261, § 2; L. 1974, ch. 352, § 135; L. 1993, ch. 13, § 2; L. 2006, ch. 84, § 1; July 1.

Law Review and Bar Journal References:

"Coal-Fired Power Plants, Greenhouse Gases, and State Statutory Substantial Endangerment Provisions: Climate Change Comes to Kansas," Robert L. Glicksman, 56 K.L.R. 517 (2008).

Attorney General's Opinions:

Secretary may deny air quality permit when determination is made that particular emissions presents substantial endangerment. 2007-31.

65-3005. Powers of the secretary. (a) The secretary shall have the power to:

(1) Adopt, amend and repeal rules and regulations implementing and consistent with this act.

(2) Hold hearings relating to any aspect of or matter in the administration of this act concerning air quality control, and in connection therewith, compel the attendance of witnesses and the production of evidence.

(3) Issue such orders, permits and approvals as may be necessary to effectuate the purposes of this act and enforce the same by all appropriate administrative and judicial proceedings.

(4) Require access to records relating to emissions which cause or contribute to air pollution.

(5) Prepare and develop a comprehensive plan or plans for the prevention, abatement and control of air pollution originating in Kansas that affects air quality in Kansas or in other states or both.

(6) Adopt rules and regulations governing such public notification and comment procedures as authorized by this act.

(7) Encourage voluntary cooperation by persons or affected groups to achieve the purposes of this act.

(8) (A) Encourage local units of government to handle air pollution problems within their respective jurisdictions and on a cooperative basis; (B) provide technical and consultative assistance therefor; and (C) enter into agreements with local units of government to administer all or part of the provisions of the Kansas air quality act in the units' respective jurisdictions.

(9) Encourage and conduct studies, investigations and research relating to air contamination and air pollution and their causes, effects, prevention, abatement and control.

(10) Encourage air contaminant emission sources to voluntarily implement strategies, including the development and use of innovative technologies, market-based principles and other private initiatives to reduce or prevent pollution.

(11) Determine by means of field studies and sampling the degree of air contamination and air pollution in the state and the several parts thereof.

(12) Establish ambient air quality standards for the state as a whole or for any part thereof.

(13) Collect and disseminate information and conduct educational and training programs relating to air contamination and air pollution.

(14) Advise, consult and cooperate with other agencies of the state, local governments, industries, other states, interstate or interlocal agencies, and the federal government, and with interested persons or groups.

(15) Accept, receive and administer grants or other funds or gifts from public and private entities, including the federal government, for the purpose of carrying out any of the functions of this act. Such funds received by the secretary pursuant to this section shall be deposited in the state treasury to the account of the department of health and environment.

(16) Enter into contracts and agreements with other state agencies or subdivisions, local governments, other states, interstate agencies, the federal government or its agencies or private entities as is necessary to accomplish the purposes of the Kansas air quality act.

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(17) Conduct or participate in intrastate or interstate emissions trading programs or other programs that demonstrate equivalent air quality benefits for the prevention, abatement and control of air pollution in Kansas or in other states or both.

(18) Prepare and adopt a regional haze plan as may be necessary to prevent, abate and control air pollution originating in Kansas that affects air quality in Kansas or in other states or both. Any regional haze plan prepared by the secretary shall be no more stringent than is required by 42 U.S.C. 7491.

(19) Participate in the activities of any visibility transport commission established under 42 U.S.C. 7492. The secretary shall report to the governor and the legislature on the activities of any such visibility transport commission annually.

(b) It is a policy of the state to regulate the air quality of the state and implement laws and regulations that are applied equally and uniformly throughout the state and consistent with those of the federal government.

(1) The secretary shall have the authority to promulgate rules and regulations to establish standards to ensure that the state is in compliance with the provisions of the federal clean air act, as amended (42 U.S.C. section 7401 et seq.). The standards so established shall not be any more stringent, restrictive or expansive than those required under the federal clean air act, as amended, nor shall the rules and regulations be enforced in any area of the state prior to the time required by the federal clean air act. If the secretary determines that more stringent, restrictive or expansive rules and regulations are necessary, the secretary may implement the rules and regulations only after approval by an act of the legislature. The restrictions of this subsection shall not apply to the parts of the state implementation plan developed by the secretary to bring a nonattainment area into compliance when needed to have a United States environmental protection agency approved state implementation plan.

(2) For any application for a permit required by federal or state law, the secretary shall not deny or delay the issuance of such permit when the requirements of this act have been met.

History: L. 1967, ch. 347, § 5; L. 1970, ch. 261, § 5; L. 1974, ch. 352, § 137; L. 1993, ch. 13, § 3; L. 2006, ch. 84, § 2; L. 2009, ch. 141, § 23; May 28.

65-3008.

Law Review and Bar Journal References:

"Coal-Fired Power Plants, Greenhouse Gases, and State Statutory Substantial Endangerment Provisions: Climate Change Comes to Kansas," Robert L. Glicksman, 56 K.L.R. 517 (2008).

65-3008a. Same; public comment and hearing; review. (a) No permit shall be issued, modified, renewed or reopened without first providing the public an opportunity to comment and request a public hearing on the proposed permit action. The request for a public hearing on the issuance of a permit shall set forth the basis for the request and a public hearing shall be held if, in the judgment of the secretary, there is sufficient reason.

(b) The secretary shall affirm, modify or reverse the decision on such permit after the public comment period or public hearing, and shall affirm the issuance of any permit the terms and conditions of which comply with all requirements established by rules and regulations promulgated pursuant to the Kansas air quality act. Any person who participated in the public comment process or the public hearing who otherwise would have standing under K.S.A. 77-611, and amendments thereto, shall have standing to obtain judicial review of the secretary's final action on the permit pursuant to the act for judicial review and civil enforcement of agency actions in the court of appeals. Any such person other than the applicant for or holder of the permit shall not be required to have exhausted administrative remedies in order to be entitled to review. The court of appeals shall have original jurisdiction to review any such final agency action. The record before the court of appeals shall be confined to the agency record for judicial review and consist of the documentation submitted to or developed by the secretary in making the final permit decision, including the permit application and any addenda or amendments thereto, the permit summary, the draft permit, all written comments properly submitted to the secretary, all testimony presented at any public hearing held on the permit application, all responses by the applicant or permit holder to any written comments or testimony, the secretary's response to the public comments and testimony and the final permit.

(c) When determined appropriate by the secretary, the procedures set out in subsection (a) may be required prior to the issuance, modification, renewal or reopening of an approval.

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History: L. 1967, ch. 347, § 7; L. 1970, ch. 261, § 7; L. 1974, ch. 352, § 139; L. 1975, ch. 312, § 11; L. 1993, ch. 13, § 4; March 25.

Research and Practice Aids:
Health and Environment ⇐ 25.6(5).
C.J.S. Health and Environment §§ 91 to 129, 130.

Law Review and Bar Journal References:
Authority to compel and compile emissions data; regulation of air and water quality in Kansas, George Cameron Coggins, 21 K.L.R. 1, 34 (1972).

Attorney General's Opinions:
Home rule powers; limitations; ability to opt out of state regulation regulating open burning. 92-10.
Confined swine feeding facilities; control of water pollution by Secretary of Kansas Department of Health and Environment. 2000-19.

65-3008. Approvals and permits for emission stationary sources. (a) No person shall construct, own, operate, install, alter or use any air contaminant emission stationary source which, in accordance with rules and regulations, the secretary finds may cause or contribute to air pollution, unless an appropriate approval or permit has been issued for the source by the secretary under this act. Approvals or permits issued by the secretary may be subject to conditions consistent with the purposes of this act and rules and regulations promulgated under this act.

(b) The secretary shall require that applications for approvals and permits, and renewals thereof, under this act shall be accompanied by application fees and such plans, specifications, compliance plans or other information as the secretary deems necessary. Applications shall be submitted on forms provided by the secretary and shall be signed by a responsible official of the source, who shall certify the accuracy of the information submitted.

(c) The issuance or holding of an approval or permit shall not convey any property right or exclusive privilege to the holder thereof.

(d) Without any further action on the part of the secretary, an approval or a permit shall become void and without effect on its expiration date unless a completed application form and any required fee are filed with the secretary on or before the expiration date of the approval or the permit. For purposes of this subsection, the secretary may specify by rule and regulation an amount of time prior to the expiration date of an operating permit by which a complete application form and any required fee must be filed with the secretary in order to be considered timely filed. The secretary may provide for a grace period by rule and regulation.

(e) The secretary may issue by rule and regulation a general approval or permit covering numerous similar sources. Any general approval or permit shall comply with all requirements applicable to approvals or permits under this act. Any source covered by a general approval or permit must apply to the secretary and receive authority to operate under the general approval or permit.

(f) The secretary may fix, charge and collect fees for approvals and permits, and the renewal thereof, to cover all or any part of the cost of administering the provisions of Kansas air quality act, other than K.S.A. 65-3027. The secretary shall adopt rules and regulations fixing such fees. The fees shall be deposited in the state treasury and credited to the state general fund, except that if all or any portion of the regulatory services for which a fee is collected under this section is performed by a county, city-county or multicounty health department, that portion of such fee which pertains to such services, as determined by the secretary, shall be credited to the local air quality control authority regulation services fund, which is hereby created in the state treasury, and shall be paid from such fund to such local air quality control authority.

History: L. 1967, ch. 347, § 8; L. 1970, ch. 261, § 8; L. 1974, ch. 352, § 140; L. 1981, ch. 250, § 1; L. 1983, ch. 286, § 3; L. 1984, ch. 313, § 126; L. 1993, ch. 13, § 5; March 25.

Law Review and Bar Journal References:
Comparison of act and Federal Air Quality Act of 1967 in "Pollution Reaches the Clean Air State," Timothy E. McKee, 9 W.L.J. 443, 454 (1970).

Attorney General's Opinions:
Confined swine feeding facilities; control of water pollution by Secretary of Kansas Department of Health and Environment. 2000-19.

65-3008a. Same; public comment and hearing. (a) No permit shall be issued, modified, renewed or reopened without first providing the public an opportunity to comment and request a public hearing on the proposed permit action. The request for a public hearing on the issuance of a permit shall set forth the basis for the request and a public hearing shall be held if, in the judgment of the secretary, there is sufficient reason.

(b) The secretary shall affirm, modify or reverse the decision on such permit after the public comment period or public hearing. Any person, other than the applicant for or holder of the per-

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KANSAS
DEPARTMENT OF HEALTH
AND ENVIRONMENT

Mark Parkinson, Governor
Roderick L. Bremby, Secretary

www.kdheks.gov

October 1, 2010

Attention Docket ID No. EPA-HQ-OAR-2010-0107
U.S. Environmental Protection Agency, EPA West (Air Docket)
1200 Pennsylvania Avenue, NW
Mail Code: 6102T
Washington, DC 20460

To Whom It May Concern:

Article 2, Section 1 of the Kansas Constitution grants to the House of Representatives and the Senate the state's legislative power, which includes the power to delegate legislative authority to state agencies. In the case of the Kansas Department of Health and Environment (KDHE), K.S.A. 2009 Supp. 65-3005(a)(1) and (6) empower the Secretary to adopt regulations implementing the Kansas air quality act. Newly enacted in 2009, subsection (b) of the statute further establishes the policy that state air quality laws and regulations are to be consistent with those of the federal government and empowers the Secretary to promulgate regulations to ensure the state's compliance with the federal clean air act, as amended. This grant of authority is not without restriction. "The standards so established shall not be any more stringent, restrictive or expansive than those required under the federal clean air act, as amended, nor shall the rules and regulations be enforced in any area of the state prior to the time required by the federal clean air act."

KDHE's rulemaking authority is subject to legislative oversight through mandated regulation adoption and filing procedures that include reviews and approvals by the Kansas Department of Administration and the Attorney General, review by the Kansas Legislature's Joint Committee on Administrative Rules and Regulations, and the opportunity for public participation. *See* K.S.A. 77-415 *et seq.*, as amended by L. 2010, Ch. 95. Within the Department of Administration's Policy and Procedure Manual for the Filing of Kansas Administrative Regulations (p. 65) is a reference to Attorney General Opinion 1977-369, issued November 30, 1977, which concludes that state agencies may adopt by reference only regulations that are known and in existence at the time of adoption.

The Environmental Protection Agency (EPA) last approved the revision of K.A.R. 28-19-350 into the Kansas State Implementation Plan (SIP) on May 29, 2007 (72 FR 29429). This regulation adopts by reference the Prevention of Significant Deterioration (PSD) applicability provisions of 40 C.F.R. 52.21, as in effect on July 1, 2004. Kansas adopted a later revision of K.A.R. 28-19-350 updating the adoption by reference of 40 C.F.R. 52.21 to July 1, 2007. The

OFFICE OF LEGAL SERVICES
KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT
CURTIS STATE OFFICE BUILDING, 1000 SW JACKSON ST., STE.560, TOPEKA, KS 66612-1368
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SIP revision for this update is pending before EPA. In either case, K.A.R. 28-19-350 predates EPA's Endangerment and Cause and Contribute Findings, Johnson Memo Reconsideration, Light-Duty Vehicle Rule, and Tailoring Rule, all of which taken together, trigger PSD applicability for greenhouse gas sources on and after January 2, 2011.

Given the current status of the Kansas SIP, the intervening changes in Kansas law and EPA's recent rule-making activities, I state as Chief Legal Counsel, that the Kansas SIP, when read as a whole, does not apply the PSD program to GHG sources or authorize Kansas to issue PSD permits for GHG sources that meet EPA requirements.

Sincerely,

Yvonne C. Anderson

Yvonne C. Anderson
Chief Legal Counsel

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POLICY AND PROCEDURE MANUAL

FOR THE FILING OF

KANSAS ADMINISTRATIVE REGULATIONS

DEPARTMENT OF ADMINISTRATION
TOPEKA, KANSAS 66612

REVISED: JANUARY 2010

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EXAMPLE:

"Fire and extended coverage insurance permitted by K.A.R. 40-5-6 ..."

EXAMPLE:

"Pursuant to K.S.A. 75-4403 and amendments thereto, any state employee may ..."

Reference an entire article within your agency's regulations as follows: ". . . as required by article 2."

(b) "Subsection" refers to the initial subdivision of a regulation, e.g., "subsection (e)." Further subdivisions should be referred to as "paragraphs," e.g., "paragraph (e)(1)."

(c) When revoking a regulation, any references to that regulation in other regulations must be stricken or otherwise modified. If a regulation is amended in a manner that changes the regulation's outline form, any internal references or references to the affected subdivisions that appear in another regulation must be amended in order to maintain the accuracy of the reference.

ADOPTIONS BY REFERENCE

When applicable and desirable, adopt by reference (according to Attorney General Opinion No. 77-369). Examples of material that an agency may desire to adopt by reference include standards of a national voluntary trade association or a federal regulation. Agencies may wish to consider adopting a document by reference when the material is lengthy, highly complex, or technical or when the material cannot be readily adapted to the form, style, and organization requirements for regulations.

The following example provides one type of format for an adoption by reference: "(Title), (volume), (page), as in effect on (a specific date), is adopted by reference."

STATE OF KANSAS

Office of the Attorney General

1st Floor, State Capitol Bldg. (913) 296-2215 Topeka, Kansas 66612

Curt T. Schneider
Attorney General

November 30, 1977

ATTORNEY GENERAL OPINION NO. 77-369

The Honorable Geneva Anderson
State Representative
3rd Floor - State Capitol Building
Topeka, Kansas 66612

Re: Department of Agriculture--Rules and Regulations--Incorporation by Reference

Synopsis: The Department of Agriculture may adopt by reference in regulations adopted by that agency rules or regulations promulgated by any federal agency, standards promulgated by a national trade, professional or like association, or similar material which is known and in existence at the time of adoption by reference, and which is identified in the adopting language by specific citation or reference thereto.

* * *

Dear Representative Anderson:

You inquire whether the Kansas Department of Agriculture is authorized in rules and regulations adopted by that department to incorporate therein by reference federal regulations or standards promulgated by national trade, professional and like associations.

It has long been the position of this office that any state officer or agency which is authorized by law to adopt rules and regulations may adopt therein by reference rules and regulations of any agency of the federal government, or standards or like matter promulgated by national associations and groups, with certain limitations.

In *State v. Crawford*, 104 Kan. 141 (1919), the defendant was charged with misdemeanors under a state statute which provided,

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among other matters, that "[a]ll electrical matters shall be in accordance with the national electrical code." That code consisted of installation rules of the National Board of Fire Underwriters for electrical wiring and apparatus, having been originally drawn under the auspices of the National Conference on Standard Electrical Rules, which had since been disbanded and its work taken over by several associations. The code was revised every two years, through the cooperative labors of the several associations, such as the American Electric Railway Association and American Institute of Electrical Engineers, to name but two. The court held that the statutory adoption of the "national electrical code" was invalid as an abdication or unlawful delegation of legislative powers to private bodies. The court stated thus, in pertinent part:

> "In our commonwealth the power to make, amend, alter and repeal the laws is vested in the legislature. That body may not abdicate its functions nor delegate its powers to any other body, however learned, wise and farsighted the latter may be. . . .
>
> Some courts, including our own, have relaxed, or seemingly relaxed, the rigid enforcement of this principle in some instances, by giving countenance to legislation enacted to punish as misdemeanors or otherwise to penalize the breach of rules promulgated or to be promulgated afterwards by some subordinate official body created by the legislature. . . .
>
> But none of the cases cited has ventured so far afield as to intimate that the legislature might delegate to some unofficial organization of private persons, like the National Fire Protective Association, the power to promulgate rules for the government of the people of this state or for the management of their property, or that the legislature might prescribe punishment for breaches of these rules. We feel certain that no such judicial doctrine has ever been announced. If assent to such a doctrine could be given, a situation would arise where owners of property with considerable persistence might learn what these code rules were and incur the expense of making their property conform thereto, only to find that the National Fire Protective Association had reconvened in Chicago,

> New York, or New Orleans, and had revised the code, and that the work and expense had to be undertaken anew. . . . Furthermore, there is no official way, indeed no practical way, for the average property owner to know what these code rules are. . . . If the legislature desires to adopt a rule of the national electrical code as a law of this state, it should copy that rule and give it a title and an enacting clause and pass it through the senate and the house of representatives by a constitutional majority and give the governor a chance to approve or veto it, and then hand it over to the secretary of state for publication."

The court held the statute to be "void for uncertainty."

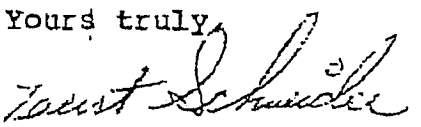
The decision is subject to varying constructions. It may be argued that it prohibits the adoption of any standards, under any circumstances, when promulgated by a private association. In my view, it does not. The constitutionally objectionable feature of the statute was that it adopted by reference a body of rules or standards which were subject to amendment or revision at any time by the promulgating associations, which amendments or revisions thereby became legally binding in this state, not through any action of the legislature, but through action of the private associations themselves. Thus, by adopting by reference the national electrical code as it may be from time to time amended and revised, the legislature had indeed delegated its legislative functions to the respective associations. The court noted a further objectional feature, that the referenced material was not in any official fashion available to the citizens of the state.

A legislative grant of authority to a public officer to promulgate rules and regulations is, itself, a delegation of legislative authority. Such a delegation is not an unlawful delegation, however, so long as the authorizing legislation prescribes sufficiently descriptive standards or guidelines to impose some practicably meaningful limitations on the exercise of that authority. In promulgating a rule or regulation which adopts by reference an existing body of regulations adopted by a federal agency, for example, or existing body of standards promulgated by a national trade association, the adopting official delegates no authority whatever, for the referenced material becomes legally applicable in this state only through the deliberate considered decision

of the adopting official or agency, in the exercise of the delegated legislative authority vested in that officer or agency, and not as the result of any action by the federal agency or voluntary association whatever. No state officer or agency may adopt by reference rules, regulations or standards as they may from time to time be amended or revised, thereby adopting by reference material which is not yet in existence, but which, as a result of its adoption by the federal agency or voluntary association becomes applicable in Kansas by operation of law. The Department of Agriculture, like any other state official or agency empowered to adopt rules and regulations may adopt only rules, regulations or standards which are known and in existence at the time of adoption by incorporation in a rule or regulation. No material may be adopted *in futuro*.

In *State v. Crawford, supra*, the court criticized the lack of any official access to the referenced code. It is not clear that that, in and of itself, poses a separate constitutional objection. Federal regulations are promulgated by publication in the Federal Register, which constitutes official notice to all persons. When published regulations are incorporated by reference to their publication in either the Federal Register or the Code of Federal Regulations, that reference is legally sufficient, in my judgment, to constitute official notification of the material thereby referenced. When standards of a national voluntary trade association, *e.g.*, are adopted by reference, it is highly desirable that the language of the adopting rule or regulation, or a footnote appended thereto, advise the reader that the referenced material is available from the adopting agency. This office has not imposed such a requirement in the past in reviewing the form and sufficiency of proposed regulations; however, future regulations will be considered with a view to requiring sufficient notice to the reader of the availability of any material referenced therein.

Yours truly,



CURT T. SCHNEIDER
Attorney General

CTS:JRM:kj

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CHAPTER 95

HOUSE Substitute for SENATE BILL No. 213

AN ACT concerning the rules and regulations filing act; pertaining to the filing process; amending K.S.A. 77-415a, 77-415b, 77-417, 77-418, 77-419, 77-420, 77-421a, 77-423, 77-428, 77-429, 77-430a and 77-436 and K.S.A. 2009 Supp. 77-415, 77-416, 77-421, 77-422, 77-424, 77-430, 77-431 and 77-435 and repealing the existing sections.

Be it enacted by the Legislature of the State of Kansas:

Section 1. K.S.A. 2009 Supp. 77-415 is hereby amended to read as follows: 77-415. ~~As used in K.S.A. 77-415 through 77-437, and amendments thereto, unless the context clearly requires otherwise:~~

~~(1) "State agency" means any officer, department, bureau, division, board, authority, agency, commission or institution of this state, except the judicial and legislative branches, which is authorized by law to promulgate rules and regulations concerning the administration, enforcement or interpretation of any law of this state.~~

~~(2) "Person" means firm, association, organization, partnership, business trust, corporation or company.~~

~~(3) "Board" means the state rules and regulations board established under the provisions of K.S.A. 77-423 and amendments thereto.~~

~~(4) "Rule and regulation," "rule," "regulation" and words of like effect mean a standard, statement of policy or general order, including amendments or revocations thereof, of general application and having the effect of law, issued or adopted by a state agency to implement or interpret legislation enforced or administered by such state agency or to govern the organization or procedure of such state agency. Every rule and regulation adopted by a state agency to govern its enforcement or administration of legislation shall be adopted by the state agency and filed as a rule and regulation as provided in this act. The fact that a statement of policy or an interpretation of a statute is made in the decision of a case or in a state agency decision upon or disposition of a particular matter as applied to a specific set of facts does not render the same a rule and regulation within the meaning of the foregoing definition, nor shall it constitute specific adoption thereof by the state agency so as to be required to be filed. A rule and regulation as herein defined shall not include any rule and regulation which: (a) Relates to the internal management or organization of the agency and does not affect private rights or interest; (b) is an order directed to specifically named persons or to a group which does not constitute a general class and the order is served on the person or persons to whom it is directed by appropriate means. The fact that the named person serves a group of unnamed persons who will be affected does not make such an order a rule and regulation; (c) relates to the use of highways and is made known to the public by means of signs or signals; (d) relates to the construction and maintenance of highways or bridges or the laying out or relocation of a highway other than bidding procedures or the management and regulation of rest areas; (e) relates to the curriculum of public educational institutions or to the administration, conduct, discipline, or graduation of students from such institutions or relates to parking and traffic regulations of state educational institutions under the control and supervision of the state board of regents; (f) relates to the emergency or security procedures of a correctional institution, as defined in subsection (d) of K.S.A. 75-5202 and amendments thereto; (g) relates to the use of facilities by public libraries; (h) relates to military or naval affairs other than the use of armories; (i) relates to the form and content of reports, records or accounts of state, county or municipal officers, institutions, or agencies; (j) relates to expenditures by state agencies for the purchase of materials, equipment, or supplies by or for state agencies, or for the printing or duplicating of materials for state agencies; (k) establishes personnel standards, job classifications, or job ranges for state employees who are in the classified civil service; (l) fixes or approves rates, prices, or charges, or rates, joint rates, fares, tolls, charges, rules, regulations, classifications or schedules of common carriers or public utilities subject to the jurisdiction of the state corporation commission, except when a statute specifically requires the same to be fixed by rule and regulation; (m) determines the valuation of securities held by insurance companies; (n) is a statistical plan relating to the administration of rate regulation laws applicable to casualty insurance or to fire and allied lines insurance; (o) is a form, the content or substantive requirements of which are prescribed by rule and regulation or statute; (p) is a pamphlet or other explanatory material not intended or designed as interpretation of legislation enforced or adopted by a state agency but is merely informational in nature; (q) establishes seasons and fixes bag, creel, possession, size or length limits for the taking or possession of wildlife, if such seasons and limits are made known to the public by other means; or (r) establishes records retention and disposition schedules for any or all state agencies.~~

~~(5) "Environmental rule and regulation" means:~~

~~(A) A rule and regulation adopted by the secretary of agriculture, the secretary of health and environment or the state corporation commission, which has as a primary purpose the protection of the environment; or~~

~~(B) a rule and regulation adopted by the secretary of wildlife and parks concerning threatened or endangered species of wildlife as defined in K.S.A. 32-958 and amendments thereto.~~

~~(6) "Small employer" means any person, firm, corporation, partnership or association that employs not more than 50 employees, the majority of whom are employed within this state.~~ *As used in K.S.A. 77-415 through 77-437, and amendments thereto, unless the context clearly requires otherwise:*

(a) "Board" means the state rules and regulations board established under the provisions of K.S.A. 77-423, and amendments thereto.

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(b) "Environmental rule and regulation" means:

(1) A rule and regulation adopted by the secretary of agriculture, the secretary of health and environment or the state corporation commission, which has as a primary purpose the protection of the environment; or

(2) a rule and regulation adopted by the secretary of wildlife and parks concerning threatened or endangered species of wildlife as defined in K.S.A. 32-958, and amendments thereto.

(c) "Person" means firm, association, organization, partnership, business trust, corporation or company.

(d) (1) "Rule and regulation," "rule," "regulation" and words of like effect mean a standard, statement of policy or general order, including amendments or revocations thereof, of general application and having the effect of law, issued or adopted by a state agency to implement or interpret legislation enforced or administered by such state agency or to govern the organization or procedure of such state agency. Every rule and regulation adopted by a state agency to govern its enforcement or administration of legislation shall be adopted by the state agency and filed as a rule and regulation as provided in this act. The fact that a statement of policy or an interpretation of a statute is made in the decision of a case or in a state agency decision upon or disposition of a particular matter as applied to a specific set of facts does not render the same a rule and regulation within the meaning of the foregoing definition, nor shall it constitute specific adoption thereof by the state agency so as to be required to be filed.

(2) A rule and regulation as herein defined shall not include any rule and regulation which:

(A) Relates to the internal management or organization of the agency and does not affect private rights or interest;

(B) is an order directed to specifically named persons or to a group which does not constitute a general class and the order is served on the person or persons to whom it is directed by appropriate means. The fact that the named person serves a group of unnamed persons who will be affected does not make such an order a rule and regulation;

(C) relates to the use of highways and is made known to the public by means of signs or signals;

(D) relates to the construction and maintenance of highways or bridges or the laying out or relocation of a highway other than bidding procedures or the management and regulation of rest areas;

(E) relates to the curriculum of public educational institutions or to the administration, conduct, discipline, or graduation of students from such institutions or relates to parking and traffic regulations of state educational institutions under the control and supervision of the state board of regents;

(F) relates to the emergency or security procedures of a correctional institution, as defined in subsection (d) of K.S.A. 75-5202, and amendments thereto;

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(G) relates to the use of facilities by public libraries;

(H) relates to military or naval affairs other than the use of armories;

(I) relates to the form and content of reports, records or accounts of state, county or municipal officers, institutions, or agencies;

(J) relates to expenditures by state agencies for the purchase of materials, equipment, or supplies by or for state agencies, or for the printing or duplicating of materials for state agencies;

(K) establishes personnel standards, job classifications, or job ranges for state employees who are in the classified civil service;

(L) fixes or approves rates, prices, or charges, or rates, joint rates, fares, tolls, charges, rules, regulations, classifications or schedules of common carriers or public utilities subject to the jurisdiction of the state corporation commission, except when a statute specifically requires the same to be fixed by rule and regulation;

(M) determines the valuation of securities held by insurance companies;

(N) is a statistical plan relating to the administration of rate regulation laws applicable to casualty insurance or to fire and allied lines insurance;

(O) is a form, the content or substantive requirements of which are prescribed by rule and regulation or statute;

(P) is a pamphlet or other explanatory material not intended or designed as interpretation of legislation enforced or adopted by a state agency but is merely informational in nature;

(Q) establishes seasons and fixes bag, creel, possession, size or length limits for the taking or possession of wildlife, if such seasons and limits are made known to the public by other means; or

(R) establishes records retention and disposition schedules for any or all state agencies.

(e) "Rulemaking" shall have the meaning ascribed to it in K.S.A. 77-602, and amendments thereto.

(f) "Small employer" means any person, firm, corporation, partnership or association that employs not more than 50 employees, the majority of whom are employed within this state.

(g) "State agency" means any officer, department, bureau, division, board, authority, agency, commission or institution of this state, except the judicial and legislative branches, which is authorized by law to promulgate rules and regulations concerning the administration, enforcement or interpretation of any law of this state.

Sec. 2. K.S.A. 77-415a is hereby amended to read as follows: 77-415a. The secretary of state shall file and publish all rules and regulations as provided by article 4 of chapter 77 of the Kansas Statutes Annotated. *The secretary of state may adopt rules and regulations necessary to carry out its duties under this act.*

Sec. 3. K.S.A. 77-415b is hereby amended to read as follows: 77-415b. ~~(a)~~ All rules and regulations of state agencies which are in force and effect at the time this act takes effect shall continue to be effective and shall be deemed to be duly filed with the secretary of state as provided for by this act until revised, amended, revoked or nullified pursuant to law.

~~(b) All temporary rules and regulations filed prior to the effective date of this act and which are in effect on the effective date of this act shall expire on October 1, 1988.~~

~~(c) On the effective date of this act, all rules and regulations of state agencies lawfully filed with the office of the revisor of statutes prior to the effective date of this act and all records pertaining to such rules and regulations shall be transferred to the office of the secretary of state.~~

Sec. 4. K.S.A. 2009 Supp. 77-416 is hereby amended to read as follows: 77-416. (a) Every state agency shall file with the secretary of state every rule and regulation adopted by it and every amendment and revocation thereof *in the manner prescribed by the secretary of state.* ~~Every rule and regulation, other than a temporary rule and regulation, filed in the office of the secretary of state shall be filed in triplicate, and nine copies of every temporary rule and regulation shall be filed in the office of the secretary of state, and each section~~ *Each rule and regulation* shall include a citation to the statutory section or sections being implemented or interpreted and a citation of the authority pursuant to which it, or any part thereof, was adopted. Every rule and regulation filed in the office of the secretary of state shall be accompanied by a copy of the economic impact statement required by subsection (b)~~,~~ *and* a copy of the environmental benefit statement if required by subsection (d). A copy of any document adopted by reference in a rule and regulation shall be available from the state agency which adopted the rule and regulation upon request by any person interested therein. The state agency, under the direction of the secretary of state, shall number each section with a distinguishing number and, in making a compilation of the rules and regulations, the sections shall be arranged in numerical order. A decimal system of numbering shall be prohibited.

(b) *(1)* At the time of drafting a proposed rule and regulation or amendment to an existing rule and regulation, the state agency shall ~~prepare a statement of~~ *consider* the economic impact of such proposed rule and regulation or amendment upon all governmental agencies or units and all persons which will be subject thereto and upon the general public. ~~The~~ *Prior to giving notice of a hearing on a proposed rule and regulation, the state agency shall prepare an* economic impact statement *that* shall include:

~~(1)~~ *(A)* A brief description of the proposed rules and regulations and what is intended to be accomplished by their adoption; ~~(2)~~

(B) whether the proposed rule and regulation is mandated by federal law as a requirement for participating in or implementing a federally subsidized or assisted program and whether the proposed rules and regulations exceed the requirements of applicable federal law; ~~(3)~~

(C) a description of the cost, the persons who will bear the costs and those who will be affected by the proposed rules and regulations, including the agency proposing the rules and regulations, other governmental agencies or units, private citizens and consumers of the products or services which are the subject of the rules and regulations or the enforcement thereof; and ~~(4)~~

(D) a description of any less costly or less intrusive methods that were considered by the state agency for achieving the stated purpose of the rules and regulations and why such methods were rejected in favor of the proposed rules and regulations. The state agency may consult with other state agencies when preparing the economic impact statement.

(2) The state agency shall consult with the League of Kansas municipalities, Kansas association of counties and the Kansas association of school boards, as appropriate, when preparing the economic impact statement of a proposed rule and regulation which increases or decreases revenues of cities, counties or school districts or imposes functions or responsibilities on cities, counties or school districts which will increase their expenditures or fiscal liability.

(3) The state agency shall reevaluate and, when necessary, update the statement ~~at the time of giving notice of hearing on a proposed rule and regulation and~~ at the time of filing a rule and regulation with the secretary of state. If a public hearing was held prior to the adoption of the rule and regulation, a state agency at the time of filing a rule and regulation with the secretary of state shall include as a part of the economic impact statement a statement specifying the time and place at which the hearing was held and the attendance at the hearing. A copy of the current economic impact statement shall be available from the state agency upon request by any party interested therein.

(c) Upon request of the state rules and regulations board, the joint committee on administrative rules and regulations or the chairperson of other committee or board, the director of the budget shall review the economic impact statement prepared by any state agency and shall prepare a supplemental or revised statement. If possible, the supplemental or revised statement shall include a reliable estimate in dollars of the anticipated change in revenues and expenditures of the state. It also shall include a statement, if determinable or reasonably foreseeable, of the immediate and long-range economic impact of the rule and regulation upon persons subject thereto, small employers and the general public. If, after careful investigation, it is determined that no dollar estimate is possible, the statement shall set forth the reasons why no dollar estimate can be given. Every state agency is directed to cooperate with the division of

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the budget in the preparation of any statement pursuant to this subsection when, and to the extent, requested by the director of the budget.

(d) At the time of drafting a proposed environmental rule and regulation or amendment to an existing environmental rule and regulation, the state agency shall ~~prepare a statement of~~ *consider* the environmental benefit of such proposed rule and regulation or amendment. ~~The~~ *Prior to giving notice of a hearing on a proposed rule and regulation, the state agency shall prepare an* environmental benefit statement *that* shall include a description of the need for and the environmental benefits which will likely accrue as the result of the proposed rule and regulation or amendment. The description shall summarize, when applicable, research indicating the level of risk to the public health or the environment being removed or controlled by the proposed rule and regulation or amendment. When specific contaminants are to be controlled by the proposed rule and regulation or amendment, the description shall indicate the level at which the contaminants are considered harmful according to currently available research. The state agency may consult with other state agencies when preparing the environmental benefit statement. The state agency shall reevaluate and, when necessary, update the statement ~~at the time of giving notice of hearing on a proposed rule and regulation and~~ at the time of filing a rule and regulation with the secretary of state. A copy of the current environmental benefit statement shall be available from the state agency upon request by any party interested therein.

(e) In addition to the requirements of subsection (b), the economic impact statement for all environmental rules and regulations shall include:

(1) A description of the capital and annual costs of compliance with the proposed rules and regulations, and the persons who will bear those costs;

(2) a description of the initial and annual costs of implementing and enforcing the proposed rules and regulations, including the estimated amount of paperwork, and the state agencies, other governmental agencies or other persons or entities who will bear the costs;

(3) a description of the costs which would likely accrue if the proposed rules and regulations are not adopted, the persons who will bear the costs and those who will be affected by the failure to adopt the rules and regulations; and

(4) a detailed statement of the data and methodology used in estimating the costs used in the statement.

~~(f) On and after the effective date of this act, the secretary of state shall have the discretion to return to the appropriate state agency or otherwise dispose of any document or other material which has been adopted previously by reference and filed with the secretary of state.~~

Sec. 5. K.S.A. 77-417 is hereby amended to read as follows: 77-417. *(a)* The secretary of state shall:

(1) Endorse on each rule and regulation filed, the time and date of the filing thereof;

(2) maintain a file of such rules and regulations for public inspection;

(3) keep a complete record of all amendments and revocations of rules and regulations;

(4) index the rules and regulations so filed; and

(5) publish the rules and regulations as hereinafter provided.

(b) The secretary of state shall have the discretion to return to the appropriate state agency or to otherwise dispose of any document or other material which had been adopted previously by reference and filed with the secretary of state.

Sec. 6. K.S.A. 77-418 is hereby amended to read as follows: 77-418. All rules and regulations adopted ~~and filed~~ by every state agency shall be ~~typewritten, mimeographed, multilithed, or printed on standard letter size (8½ by 11 inches) paper, the kind, grade, and durability thereof to be subject to the approval of the secretary of state. If any rule and regulation is amended or revoked after the same has been adopted and filed, each rule and regulation amended or revoked shall be filed on a separate sheet or sheets of paper, except this filing requirement may be complied with for consecutively numbered rules and regulations which are being revoked by filing with the secretary of state a statement clearly identifying the consecutively numbered rules and regulations. Such statement shall clearly express that the consecutively numbered rules and regulations are being revoked and shall specify the effective date of the revocation of such rules and regulations. If a rule and regulation is filed with the secretary of state on more than one page, each page of such rule and regulation, subsequent to the first page, shall be consecutively numbered at the top of each page, and the number of the rule and regulation shall be placed in the upper right hand corner of each page~~ *filed with the secretary of state in a form and manner approved by the secretary of state.*

Sec. 7. K.S.A. 77-419 is hereby amended to read as follows: 77-419. ~~No section of any rule and regulation shall be revived or amended unless~~ *To revive or amend a rule and regulation,* the new rule and regulation ~~contains~~ *shall contain* the entire section revived or amended, and any section so amended shall be revoked. For the purpose of filing in the office of the secretary of state and for submission to the joint committee on administrative rules and regulations ~~and to the legislature~~ as provided in K.S.A. 77-426, and amendments thereto, a rule and regulation amending an existing regulation shall indicate the new matter contained therein by underlining or printing in italics the new matter, and material to be deleted from such rule and regulation shall be shown in ~~cancelled~~ *strike-through* type. The secretary of state in preparing such rules and regulations for publication in the Kansas administrative regulations shall omit material shown in ~~cancelled type and such rules and regulations shall~~

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~~be printed in Roman style~~ *strike-through* type. The secretary of state shall not file any regulation which amends or revives a regulation unless the regulation so amending or reviving conforms to the provisions of this section.

Sec. 8. K.S.A. 77-420 is hereby amended to read as follows: 77-420. (a) Every rule and regulation proposed to be adopted by any state agency, before being submitted to the attorney general under this section, shall be submitted to the secretary of administration for approval of its organization, style, orthography and grammar subject to such requirements as to organization, style, orthography and grammar as the secretary may adopt. Every rule and regulation submitted to the secretary of administration under this subsection (a) shall be accompanied by a copy of any document which is adopted by reference by the rule and regulation. Every rule and regulation approved by the secretary of administration under this subsection (a) shall be stamped as approved and the date of such approval shall be indicated therein.

(b) Every rule and regulation proposed by any state agency which has been approved by the secretary of administration as provided in subsection (a) before being adopted or filed shall be submitted to the attorney general for an opinion as to the legality of the same, ~~and the~~ *including whether the making of such rule and regulation is within the authority conferred by law on the state agency. The* attorney general shall promptly furnish an opinion as to the legality of the proposed rule and regulation so submitted. Every rule and regulation submitted to the attorney general under this subsection (b) shall be accompanied by a copy of any document which is adopted by reference by the rule and regulation. Every rule and regulation approved by the attorney general under this subsection (b) shall be stamped as approved and the date of such approval shall be indicated therein.

(c) No rule and regulation shall be filed by the secretary of state unless:

(1) The organization, style, orthography and grammar have been approved by the secretary of administration;

(2) the rule and regulation has been approved in writing by the attorney general as to legality;

(3) ~~the attorney general finds that the making of such rule and regulation is within the authority conferred by law on the state agency submitting the same;~~

~~(4)~~ the rule and regulation has been formally adopted by the state agency after it has been approved by the secretary of administration and the attorney general and is accompanied by a certified or other formal statement of adoption when adoption is by an executive officer of a state agency, or by a certified copy of the roll call vote required for its adoption by K.S.A. 77-421, and amendments thereto, when adoption is by a board, commission, authority or other similar body;

~~(5)~~ *(4)* the rule and regulation to be filed is accompanied by a copy of the economic impact statement as provided by K.S.A. 77-416, and amendments thereto; *and*

~~(6)~~ *(5)* the rule and regulation to be filed is accompanied by a copy of the environmental benefit statement required by K.S.A. 77-416 and amendments thereto, if applicable~~; and~~

~~(7) the rule and regulation is accompanied by a copy of any document which is adopted by reference by such rule and regulation unless specifically exempt by the state rules and regulations board pursuant to subsection (a) of K.S.A. 77-416, and amendments thereto.~~

Sec. 9. K.S.A. 2009 Supp. 77-421 is hereby amended to read as follows: 77-421. (a) (1) Except as provided by subsection (a)(2) ~~or subsection (a)(3)~~, *subsection (a)(3) or subsection (a)(4)*, prior to the adoption of any permanent rule and regulation or any temporary rule and regulation which is required to be adopted as a temporary rule and regulation in order to comply with the requirements of the statute authorizing the same and after any such rule and regulation has been approved by the secretary of administration and the attorney general, the adopting state agency shall give at least 60 days' notice of its intended action in the Kansas register and to the secretary of state and to the joint committee on administrative rules and regulations established by K.S.A. 77-436, and amendments thereto. The notice shall be ~~mailed~~ *provided* to the secretary of state and to the chairperson, *vice chairperson, ranking minority member* of the joint committee *and legislative research department* and shall be published in the Kansas register. A complete copy of all proposed rules and regulations and the complete economic impact statement required by K.S.A. 77-416, and amendments thereto, shall accompany the notice sent to the secretary of state. The notice shall contain:

(A) A summary of the substance of the proposed rules and regulations;

(B) a summary of the economic impact statement indicating the estimated economic impact on governmental agencies or units, persons subject to the proposed rules and regulations and the general public;

(C) a summary of the environmental benefit statement, if applicable, indicating the need for the proposed rules and regulations;

(D) the address where a complete copy of the proposed rules and regulations, the complete economic impact statement, the environmental benefit statement, if applicable, required by K.S.A. 77-416, and amendments thereto, may be obtained;

(E) the time and place of the public hearing to be held; the manner in which interested parties may present their views; and

(F) a specific statement that the period of 60 days' notice constitutes

a public comment period for the purpose of receiving written public comments on the proposed rules and regulations and the address where such comments may be submitted to the state agency. Publication of such notice in the Kansas register shall constitute notice to all parties affected by the rules and regulations.

(2) Prior to adopting any rule and regulation which establishes seasons and fixes bag, creel, possession, size or length limits for the taking or possession of wildlife and after such rule and regulation has been approved by the secretary of administration and the attorney general, the secretary of the department of wildlife and parks shall give at least 30 days' notice of its intended action in the Kansas register and to the secretary of state and to the joint committee on administrative rules and regulations created pursuant to K.S.A. 77-436, and amendments thereto. All other provisions of subsection (a)(1) shall apply to such rules and regulations, except that the statement required by subsection (a)(1)(E) shall state that the period of 30 days' notice constitutes a public comment period on such rules and regulations.

(3) Prior to adopting any rule and regulation which establishes any permanent prior authorization on a prescription-only drug pursuant to K.S.A. 39-7,120, and amendments thereto, or which concerns coverage or reimbursement for pharmaceuticals under the pharmacy program of the state medicaid plan, and after such rule and regulation has been approved by the secretary of administration and the attorney general, the ~~secretary of social and rehabilitation services~~ *Kansas health policy authority* shall give at least 30 days' notice of ~~such secretary's~~ *its* intended action in the Kansas register and to the secretary of state and to the joint committee on administrative rules and regulations created pursuant to K.S.A. 77-436, and amendments thereto. All other provisions of subsection (a)(1) shall apply to such rules and regulations, except that the statement required by subsection (a)(1)(E) shall state that the period of 30 days' notice constitutes a public comment period on such rules and regulations.

(4) Prior to adopting any rule and regulation pursuant to subsection (c), the state shall give at least 30 days' notice of its intended action in the Kansas register and to the secretary of state and to the joint committee on administrative rules and regulations created pursuant to K.S.A. 77-436, and amendments thereto. All other provisions of subsection (a)(1) shall apply to such rules and regulations, except that the statement required by subsection (a)(1)(E) shall state that the period of notice constitutes a public comment period on such rules and regulations.

(b) *(1)* On the date of the hearing, all interested parties shall be given reasonable opportunity to present their views or arguments on adoption of the rule and regulation, either orally or in writing. ~~When requested to do so, the state agency shall prepare a concise statement of the principal reasons for adopting the rule and regulation or amendment thereto. At~~

the time it adopts or amends a rule and regulation, the state agency shall prepare a concise statement of the principal reasons for adopting the rule and regulation or amendment thereto, including:

(A) The agency's reasons for not accepting substantial arguments made in testimony and comments; and

(B) the reasons for any substantial change between the text of the proposed adopted or amended rule and regulation contained in the published notice of the proposed adoption or amendment of the rule and regulation and the text of the rule and regulation as finally adopted.

(2) Whenever a state agency is required by any other statute to give notice and hold a hearing before adopting, amending, reviving or revoking a rule and regulation, the state agency, in lieu of following the requirements or statutory procedure set out in such other law, may give notice and hold hearings on proposed rules and regulations in the manner prescribed by this section.

(3) Notwithstanding the other provisions of this section, the Kansas parole board and the secretary of corrections, may give notice or an opportunity to be heard to any inmate in the custody of the secretary of corrections with regard to the adoption of any rule and regulation, but the secretary shall not be required to give such notice or opportunity.

(c) (1) The agency shall initiate new rulemaking proceedings under this act, if a state agency proposes to adopt a final rule and regulation that:

(A) Differs in subject matter or effect in any material respect from the rule and regulation as originally proposed; and

(B) is not a logical outgrowth of the rule and regulation as originally proposed.

(2) In accordance with subsection (a), the period for public comment required by K.S.A. 77-421, and amendments thereto, may be shortened not less than 30 days.

(3) For the purposes of this provision, a rule and regulation is not the logical outgrowth of the rule and regulation as originally proposed if a person affected by the final rule and regulation was not put on notice that such person's interests were affected in the rulemaking.

(d) When, pursuant to this or any other statute, a state agency holds a hearing on the adoption of a proposed rule and regulation, the agency shall cause written minutes or other records, including a record maintained on sound recording tape or on any electronically accessed medium or any combination of written or electronically accessed media records of the hearing to be made. If the proposed rule and regulation is adopted and becomes effective, the state agency shall maintain, for not less than three years after its effective date, such minutes or other records, together with *any recording, transcript or other record made of the hearing and a* list of all persons who appeared at the hearing and who they

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represented, any written testimony presented at the hearing and any written comments submitted during the public comment period.

~~(d)~~ *(e)* No rule and regulation shall be adopted by a board, commission, authority or other similar body except at a meeting which is open to the public and notwithstanding any other provision of law to the contrary, no rule and regulation shall be adopted by a board, commission, authority or other similar body unless it receives approval by roll call vote of a majority of the total membership thereof.

Sec. 10. K.S.A. 77-421a is hereby amended to read as follows: 77-421a. Whenever any officer, department, bureau, division, board, authority, agency, commission or institution of this state, except the judicial and the legislative branches, is authorized by law to promulgate rules and regulations concerning the administration, enforcement or interpretation of any law of this state, and such rules and regulations are exempt from the requirements of K.S.A. 77-415 *et seq.*, and amendments thereto, by virtue of the definition of "rule or regulation" in subsection ~~(4)~~ *(e)* of K.S.A. 77-415, and amendments thereto, such rules and regulations shall be adopted in the manner prescribed by K.S.A. 77-421, and amendments thereto, after notice has been given and a hearing held in the manner prescribed by K.S.A. 77-421, and amendments thereto. This section shall not apply to orders issued by directors of correctional institutions under K.S.A. 75-5256, *and amendments thereto*.

Sec. 11. K.S.A. 2009 Supp. 77-422 is hereby amended to read as follows: 77-422. (a) A rule and regulation may be adopted by a state agency as a temporary rule and regulation if the state agency and the state rules and regulations board finds that the preservation of the public peace, health, safety or welfare necessitates or makes desirable putting such rule and regulation into effect prior to the time it could be put into effect if the agency were to comply with the notice, hearing and publication requirements of this act or prior to the effective date prescribed by K.S.A. 77-426, and amendments thereto.

(b) Temporary rules and regulations may be adopted without the giving of notice and the holding of a hearing thereon.

(c) *(1)* A temporary rule and regulation shall take effect: ~~(1)~~

(A) After approval by the secretary of administration and the attorney general as provided by K.S.A. 77-420, and amendments thereto; ~~(2)~~

(B) after approval by the state rules and regulations board as provided by K.S.A. 77-423, and amendments thereto; and ~~(3)~~

(C) upon filing with the secretary of state.

(2) The effective date of all or specific parts of a temporary rule and regulation may be delayed to a date later than its filing date if the delayed effective date of such rule and regulation, or specific parts thereof, is clearly expressed in the body of such rule and regulation.

(3) A temporary rule and regulation shall be effective for a period not

to exceed 120 days *except that, for good cause, a state agency may request that a temporary rule and regulation may be renewed one time for an additional period not to exceed 120 days.*

(d) A temporary rule and regulation which amends an existing rule and regulation shall have the effect of suspending the force and effect of the existing rule and regulation until such time as the temporary rule and regulation is no longer effective. In such case, at the time the temporary rule and regulation ceases to be effective, the existing permanent rule and regulation which was amended by the temporary rule and regulation shall be in full force and effect unless such existing rule and regulation is otherwise amended, revoked or suspended as provided by law.

(e) Temporary rules and regulations shall be numbered in accordance with the numbering arrangement approved by the secretary of state and otherwise shall conform to the approval, adoption and filing requirements of this act, insofar as the same can be made applicable.

Sec. 12. K.S.A. 77-423 is hereby amended to read as follows: 77-423. There is hereby created a state rules and regulations board consisting of the attorney general *or the attorney general's designee*, the secretary of state *or the secretary of state's designee*, the secretary of administration *or the secretary of administration's designee*, the chairperson of the joint committee on administrative rules and regulations or a member of the joint committee designated by the chairperson from the same house of the legislature as the chairperson and the vice-chairperson of the joint committee on administrative rules and regulations or a member of the joint committee designated by the vice-chairperson from the same house of the legislature as the vice-chairperson. If a member is designated to serve on the board by the chairperson or vice-chairperson of the joint committee, the designated member shall serve in lieu of the designating officer on a temporary or permanent basis as specified by the designating officer. The attorney general shall be the chairperson of the board. The secretary of state shall serve as the secretary to the board. The state rules and regulations board shall determine whether a rule and regulation should be adopted as a temporary rule and regulation, shall determine the rules and regulations to be published in the Kansas administrative regulations and in the annual supplement to such regulations as provided by this act and shall perform such other duties as may be required by this act.

Sec. 13. K.S.A. 2009 Supp. 77-424 is hereby amended to read as follows: 77-424. The state rules and regulations board shall meet as soon as possible after January 1 each year to determine which rules and regulations filed during the preceding calendar year are to be published in the Kansas administrative regulations or annual supplement thereto. For the purpose of avoiding unwarranted expense, the board may authorize and direct the secretary of state to withhold publication of any technical

rule and regulation of any state agency where such rules and regulations are of limited public interest and are or will be available in published form. In every such case where the rules and regulations are not published in the Kansas administrative regulations or annual supplement, reference shall be made by the secretary of state to the rules and regulations omitted therefrom, and shall state how such rules and regulations may be obtained and that the rules and regulations so omitted are on file in the office of the secretary of state. ~~Rules and regulations adopted jointly by two or more agencies shall not be published in more than one place in the compilation or supplement thereto.~~

Sec. 14. K.S.A. 77-428 is hereby amended to read as follows: 77-428. (a) At the beginning of each calendar year the secretary of state, as soon as possible, shall assemble all rules and regulations, except temporary rules and regulations, filed during the preceding year in accordance with the provisions of this act. The state rules and regulations board shall determine which of such rules and regulations are to be published in the Kansas administrative regulations or annual supplement as provided in this act.

(b) Annual supplements shall be cumulative and shall include all rules and regulations published in the annual supplement in the next preceding year which remain in force and effect on the effective date of the current supplement, together with all rules and regulations, other than temporary rules and regulations, which were regularly adopted and filed in the office of the secretary of state in the year next preceding the year when such annual supplement is published and which were approved for publication by the state rules and regulations board.

(c) The secretary of state shall prepare annual supplements to the rules and regulations and material to be published therewith, ~~in one or more paperbound volumes~~ in the form determined by the secretary of state. The annual supplement of rules and regulations shall be published and shall include a general index of all rules and regulations contained therein and such notes, cross references and explanatory materials as will facilitate the use of such supplements. ~~All rules and regulations and material published in the annual supplement shall be delivered to and published by the director of printing.~~ Authentication of all supplement volumes shall be in the manner provided in K.S.A. 77-429, and amendments thereto. The director of printing shall print the number of copies requisitioned by the secretary of state.

Sec. 15. K.S.A. 77-429 is hereby amended to read as follows: 77-429. *(a)* Before ~~any copies of~~ *the* Kansas administrative regulations or the annual supplement thereto shall be ~~printed by the division of printing, sold and delivered~~ *published* by the secretary of state, they shall be examined and compared by the attorney general and the secretary of state, and if they contain all rules and regulations approved for ~~printing and~~

cation by the board, and otherwise comply with the terms of this act, they shall so certify ~~in writing~~ and after such authentication they shall be deemed and held to be "Kansas administrative regulations" and evidence in all courts having jurisdiction in the state; and such authentication shall ~~be printed on each~~ *accompany each electronic or printed* copy of Kansas administrative regulations and annual supplement thereto.

(b) (1) The secretary of state shall prepare a searchable database containing all of the Kansas administrative regulations, including any supplements, published pursuant to this section by July 1, 2012, if practicable. The database shall be constructed in such a manner that any person accessing or using such database shall be able to search for any rule and regulation based upon the number or subject matter of the rule and regulation or by keyword search. The initial search shall return a list of all rules and regulations which contain the initial search term.

(2) Using any rule and regulation containing the initial search term as an entry point into the database, the database shall permit the person using such database to:

(A) View all occurrences of the search term in the rule and regulation retrieved; and

(B) using the initially retrieved rule and regulation as an entry point into the database's hierarchy, navigate to each rule and regulation which follows or precedes the initial rule and regulation.

Sec. 16. K.S.A. 2009 Supp. 77-430 is hereby amended to read as follows: 77-430. (a) ~~The Kansas administrative regulations shall be printed by the director of printing and delivered to the secretary of state who shall dispose of them as follows:~~

~~First, the secretary of state shall deposit in the supreme court law library and the state library such number of copies as the state law librarian and the state librarian, respectively, shall request for use in the law library and the state library, for purposes of the publication collection and depository system established under K.S.A. 75-2566, and amendments thereto, and for the purpose of exchange. The secretary of state shall distribute to the university of Kansas school of law and to Washburn university school of law the number of copies as the librarians of the schools of law, respectively, certify to the secretary of state as necessary for the purpose of exchange. The secretary of state shall retain two copies thereof in the secretary of state's office.~~

~~Second, the secretary of state shall distribute:~~

~~One copy to each member of the legislature at the time of taking office, election or appointment, for the member's first term of office as a member of either house of the legislature which commences on or after the second Monday of January in 1991, except that a term of office as a member of either house of the legislature, whether a complete or partial term of office, shall not be construed for purposes of this distri-~~

~~bution to be the member's first term of office if such term of office is part of a continuous period of service as a member of either house of the legislature or both houses of the legislature, in any combination of consecutive terms of office;~~

~~(2) one copy each to the governor, lieutenant governor, attorney general and state historical society library;~~

~~(3) to the several offices of the judicial branch of state government, the number of copies necessary to conduct the official business of such offices, as requested by the chief justice of the supreme court;~~

~~(4) two copies to the Washburn university school of law, for use in the law library, and two copies to the university of Kansas school of law, for use in the law library;~~

~~(5) one copy to each county law library, upon request by the librarian thereof;~~

~~(6) one copy to the city library in each city of the first and second classes, upon request by the librarian thereof, and~~

~~(7) one copy to each county library, upon request by the librarian thereof.~~

~~*Third,* the secretary of state shall distribute to the several offices of the legislative branch of government, the number of copies necessary to conduct the official business of such offices, as follows: (1) To the office of revisor of statutes as the revisor of statutes shall request; (2) to the legislative research department as the director of legislative research shall request; (3) to the division of post audit as the post auditor shall request; and (4) to the division of legislative administrative services as the director of legislative administrative services shall request.~~

~~*Fourth,* the balance of the Kansas administrative regulations after such distribution shall be kept by the secretary of state for sale as provided by this section.~~ *The secretary of state shall publish the Kansas administrative regulations in an electronic or paper medium. The secretary of state shall make the Kansas administrative regulations available by request to the following:*

(1) The supreme court law library and the state library.

(2) The law schools and law libraries of the university of Kansas and Washburn university.

(3) Each member of the legislature at the time of taking office after election or appointment, for the member's first term of office as a member of either house of the legislature which commences on or after the second Monday of January in 1991, except that a term of office as a member of either house of the legislature, whether a complete or partial term of office, shall not be construed for purposes of this distribution to be the member's first term of office if such term of office is part of a continuous period of service as a member of either house of the legislature or both houses of the legislature, in any combination of consecutive terms of office.

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(4) each member of the joint committee on administrative rules and regulations;

(5) the governor, lieutenant governor, attorney general and state historical society library;

(6) the judicial branch of state government;

(7) each county law library;

(8) the city library in each city of the first and second class;

(9) each county library;

(10) the office of revisor of statutes;

(11) the legislative research department;

(12) the division of post audit; and

(13) the division of legislative administrative services.

(b) The Kansas administrative regulations may be purchased in complete sets or in single volumes. Single volumes of the Kansas administrative regulations shall be sold by the secretary of state at the per volume price fixed by the secretary of state under this section. Complete sets of the Kansas administrative regulations shall be sold by the secretary of state at the per set price fixed therefor by the secretary of state under this section. ~~Copies may be delivered by postpaid mail by the secretary of state.~~

(c) All moneys received from such sales shall be remitted to the state treasurer in accordance with the provisions of K.S.A. 75-4215, and amendments thereto. Upon receipt of each such remittance, the state treasurer shall deposit the entire amount in the state treasury to the credit of the information and services fee fund of the secretary of state.

(d) The secretary of state shall fix by rules and regulations the per volume and complete set prices of the Kansas administrative regulations sold under this section to recover the costs of ~~printing and binding such volumes~~ *publishing such volumes, whether in printed or electronic form.* The secretary of state shall revise such prices from time to time for the purposes of covering and recovering such costs.

Sec. 17. K.S.A. 77-430a is hereby amended to read as follows: 77-430a. (a) The secretary of state shall edit and prepare for ~~printing and publication~~ volumes of rules and regulations which replace existing volumes of the Kansas administrative regulations within the limitations of available appropriations therefor. Replacement volumes shall be published ~~and printed~~ in the same format and in accordance with the same drafting specifications used in the volume replaced and shall be authenticated as required by K.S.A. 77-429, and amendments thereto. Replacement volumes of the Kansas administrative regulations shall be ~~printed by the director of printing and delivered to~~ *published by* the secretary of state who shall distribute and sell such replacement volumes in the same manner as provided in K.S.A. 77-430, and amendments thereto, for the distribution and sale of other volumes of the Kansas administrative reg-

ulations, except that each member of the senate or house of representatives shall receive, *upon request,* one copy of each replacement volume for the purpose of updating the set of the Kansas administrative regulations received at the time of taking office for the member's first term of office as a member of either house of the legislature as provided in K.S.A. 77-430, and amendments thereto.

(b) ~~Whenever it shall become necessary to print additional copies of any volume of the Kansas administrative regulations, the secretary of state shall requisition the necessary number of copies from the director of printing.~~ *Moneys received from the sale of replacement volumes under this section shall be remitted to the state treasurer in accordance with the provisions of K.S.A. 75-4215, and amendments thereto. Upon receipt of each such remittance, the state treasurer shall deposit the entire amount in the state treasury to the credit of the information and services fee fund of the secretary of state.*

(c) The secretary of state shall fix by rules and regulations the per volume price, or the complete set price if more than one replacement volume is published, of any replacement volume of the Kansas administrative regulations sold under this section to recover the costs of publishing such volumes, whether in printed or electronic form. The secretary of state shall revise such prices from time to time for the purposes of covering and recovering such costs.

Sec. 18. K.S.A. 2009 Supp. 77-431 is hereby amended to read as follows: 77-431. (a) ~~Copies of~~ *The secretary of state shall publish and make available* the annual supplements to the Kansas administrative regulations ~~shall be printed and delivered to the secretary of state who shall distribute them as follows:~~

~~*First,*~~. The secretary of state shall transmit the same number of copies of each annual supplement in the same manner as provided in ~~the first, second and third clauses of~~ subsection (a) of K.S.A. 77-430, and amendments thereto, for distribution of Kansas administrative regulations, except that each member of the senate or house of representatives shall receive, *upon request,* one copy of each annual supplement for the purpose of updating the set of the Kansas administrative regulations received at the time of taking office for the member's first term of office as a member of either house of the legislature as provided in K.S.A. 77-430, and amendments thereto.

~~*Second,* the balance of annual supplement volumes after such distribution shall be kept by the secretary of state for sale at the per supplement volume price, or the complete set price if more than one volume is published for any annual supplement, which is fixed by the secretary of state under this section.~~ *The secretary of state may publish the supplements to the Kansas administrative regulations in an electronic or paper medium.*

(b) Moneys received from the sale of supplements under this section

shall be remitted to the state treasurer in accordance with the provisions of K.S.A. 75-4215, and amendments thereto. Upon receipt of each such remittance, the state treasurer shall deposit the entire amount in the state treasury to the credit of the information and services fee fund of the secretary of state.

(c) The secretary of state shall fix by rules and regulations the per volume price, or the complete set price if more than one volume is published, for each annual supplement to the Kansas administrative regulations sold under this section to recover the costs of ~~printing and binding~~ *publishing, whether published in an electronic or paper medium.* The secretary of state shall revise such prices from time to time for the purposes of covering and recovering such costs.

Sec. 19. K.S.A. 2009 Supp. 77-435 is hereby amended to read as follows: 77-435. In publishing the material in the Kansas administrative regulations and latest supplements thereto, the secretary of state shall not alter the sense, meaning or effect of any rule and regulation but may correct manifest orthographical, clerical or typographical errors and may edit the rules and regulations in the following manner:

(a) ~~By inserting the correct references in lieu of any internal cross-references to session laws or other outdated statutory references or outdated references to other rules and regulations sections.~~

(b) By changing descriptive-subject-word headings of sections, subsections or subparts of a rule and regulation in order to briefly and clearly indicate the subject matter of such sections.

(c) ~~Wherever a board, commission, commissioner, department or other agency or officer of the state government has been abolished by statute and the powers, duties and jurisdiction thereof transferred to some other board, commission, commissioner, department or other agency or officer now in existence, the secretary of state may edit the rules and regulations affected thereby by striking out the name of the abolished board, commission, commissioner, department or other agency or officer and inserting in lieu thereof the name of the proper board, commission, commissioner, department or other agency or officer.~~

(d) Where a pronoun of only masculine or only feminine gender appears, a pronoun of the opposite gender may be added, or language may be changed for the same purpose, so long as the opening limitation of this section is not violated.

(e) By striking the word "that" wherever it appears as the first word of any section in the Kansas administrative regulations or the latest supplement thereto.

(f) By correcting doublets.

The secretary of state may submit to the state rules and regulations board for the board's approval, any proposed changes made pursuant to the provisions of this section. No change made pursuant to the provisions

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of this section shall effect any change in the substantive meaning of the rule and regulation section, and any error made by the secretary of state in editing the rules and regulations as authorized by this section shall be construed as a clerical error only.

Sec. 20. K.S.A. 77-436 is hereby amended to read as follows: 77-436. (a) There is hereby established a joint committee on administrative rules and regulations which shall consist of five senators and seven members of the house of representatives. The five senator members shall be appointed as follows: Three by the committee on organization, calendar and rules and two by the minority leader of the senate. The seven representative members shall be appointed as follows: Four by the speaker of the house of representatives and three by the minority leader of the house of representatives. The committee on organization, calendar and rules shall designate a senator member to be chairperson or vice-chairperson of the joint committee as provided in this section. The speaker of the house of representatives shall designate a representative member to be chairperson or vice-chairperson of the joint committee as provided in this section.

(b) A quorum of the joint committee on administrative rules and regulations shall be seven. All actions of the committee may be taken by a majority of those present when there is a quorum. In odd-numbered years the chairperson of the joint committee shall be the designated member of the house of representatives from the convening of the regular session in that year until the convening of the regular session in the next ensuing year. In even-numbered years the chairperson of the joint committee shall be the designated member of the senate from the convening of the regular session of that year until the convening of the regular session of the next ensuing year. The vice-chairperson shall exercise all of the powers of the chairperson in the absence of the chairperson.

(c) All proposed rules and regulations shall be reviewed by the joint committee on administrative rules and regulations during the public comment period required by K.S.A. 77-421, and amendments thereto. All ~~proposed forms used by state agencies and all~~ proposed rules and regulations specifically excluded from the definition of rule and regulation under subsection ~~(4)~~ *(e)* of K.S.A. 77-415, and amendments thereto, shall be subject to review by the joint committee. The committee may introduce such legislation as it deems necessary in performing its functions of reviewing administrative rules and regulations and agency forms.

(d) All rules and regulations filed each year in the office of secretary of state ~~and all forms used by state agencies~~ and all rules and regulations specifically excluded from the definition of rule and regulation under subsection ~~(4)~~ *(e)* of K.S.A. 77-415, and amendments thereto, shall be subject to review by the joint committee. The committee may introduce such legislation as it deems necessary in performing its functions of reviewing administrative rules and regulations and agency forms.

(e) The joint committee shall meet on call of the chairperson as authorized by the legislative coordinating council. All such meetings shall be held in Topeka, unless authorized to be held in a different place by the legislative coordinating council. Members of the joint committee shall receive compensation and travel expenses and subsistence expenses or allowances as provided in K.S.A. 75-3212, and amendments thereto, when attending meetings of such committee authorized by the legislative coordinating council.

(f) Amounts paid under authority of this section shall be paid from appropriations for legislative expense and vouchers therefor shall be prepared by the director of legislative administrative services and approved by the chairperson or vice-chairperson of the legislative coordinating council.

Sec. 21. K.S.A. 77-415a, 77-415b, 77-417, 77-418, 77-419, 77-420, 77-421a, 77-423, 77-428, 77-429, 77-430a and 77-436 and K.S.A. 2009 Supp. 77-415, 77-416, 77-421, 77-422, 77-424, 77-430, 77-431 and 77-435 are hereby repealed.

Sec. 22. This act shall take effect and be in force from and after its publication in the statute book.

Approved April 8, 2010.

CHAPTER 96

HOUSE BILL No. 2500

AN ACT concerning cities and municipalities; relating to municipal insurance pools; amending K.S.A. 12-2618 and repealing the existing section.

Be it enacted by the Legislature of the State of Kansas:

Section 1. K.S.A. 12-2618 is hereby amended to read as follows: 12-2618. Application for a certificate of authority to operate a pool shall be made to the commissioner of insurance not less than 30 days prior to the proposed inception date of the pool. The application shall include the following:

(a) A copy of the bylaws of the proposed pool, a copy of the articles of incorporation, if any, and a copy of all agreements and rules of the proposed pool. If any of the bylaws, articles of incorporation, agreements or rules are changed, the pool shall notify the commissioner within 30 days after such change.

(b) Designation of the initial board of trustees and administrator. When there is a change in the membership of the board of trustees or

Health Impacts of Large-Scale Agriculture Burning — Kansas, 2006

Ingrid Garrison, DVM, MPH, DACVPM
Environmental Health Officer &
State Public Health Veterinarian
Kansas Dept. of Health and Environment

Our Vision – Healthy Kansas Living in Safe and Sustainable Environments

Background

- ~5 million acres of land are burned each year in Kansas during the mid- to late part of April
- This event contributes to regional elevations of particulate matter in ambient air
- There is a positive association between increased fine particulate matter concentrations and cardiovascular and respiratory health outcomes
- Study conducted in 2006 by KDHE & CDC
- Better understand the unknown impact of large-scale agricultural burning (LSAgB) on health outcomes in Kansas

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Objectives

- Describe demographic features of patients that present to area emergency departments (EDs) and hospitals
- Develop a better understanding of the unknown magnitude and distribution of ED and hospital admissions for cardiovascular and respiratory illness prior to, during, and immediately subsequent to peak periods of LSAgB in Kansas

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Methods

- Obtained ED and hospital data on visits for cardiovascular and respiratory conditions from three hospitals
  - Stormont-Vail HealthCare, Topeka
  - St. Francis Health Center, Topeka
  - Newman Regional Health, Emporia
- Three periods of service
  - Pre-burn (February 2-16, 2006)
  - Agricultural burn (April 2-16, 2006)
  - Post-burn (June 2-16, 2006)

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Methods

- Visits for cardiovascular and respiratory conditions identified by ICD-9 coding system
  - Grouped into general categories for analysis
- Calculated mean, median, and ranges for patient's age
- Frequency distributions for sex, hospital location and all diagnosis categories by burn period
- Logistic regression used to predict probability of an individual having a particular cardiovascular or respiratory diagnosis during the burn event compared to after the burn event

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Results

- 2,997 total ED visits and hospitalizations for all three periods of time
- 70.2% (2,103/2,997) were ED visits
- Highest proportion of ED visits during pre-burn period, 42% (896/2,103)
- Patients with ED visits were younger on average compared to patients with hospitalizations for each of the three periods
- Highest proportion of ED visits for all three study periods was from St. Francis

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Results

- Highest proportion of hospitalizations for all three study periods was from Stormont-Vail
- More ED visits were for respiratory diagnoses than for cardiovascular diagnoses during each of the three study periods
- Hospitalizations for cardiovascular diagnoses were greater than for respiratory diagnoses

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Results

- Preliminary data analyses suggest statistically significant increases in the probability of asthma ED visits and hospitalizations during the agricultural burn period compared to the post-burn period with a 40% [OR 1.4 (1.0-2.0)] increased probability of ED visits for asthma and an almost five fold [OR 4.8 (1.5-15.3)] increased probability of hospitalization for asthma

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Limitations

- Preliminary study with data limited to three hospitals in two cities
- Based on results from one burn season only
- Health outcomes limited to potential exacerbations from exposure to particulate matter
- Study design did not take into account exposure levels for study subjects (ecologic design)

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Conclusions

- Preliminary data suggest an increase in ED visits and hospitalizations for asthma during the agricultural burn period
- A collaborative study of health effects data and air sampling will help develop a better understanding of the air quality and health impact of LSAgB events in Kansas

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Acknowledgements

- Dr. Gail Hansen
- Lesa Roberts
- Kansas Hospital Association
- CDC, National Center for Environmental Health

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Questions?

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Consumptive Use - Non Consumptive Use for power plants in Kansas

2008 Data
Industrial UMW

PID	SEQ	NAME	ENERGY CENTER	Total Diversions 2008 GALLONS	Consumptive Use 2008 GALLONS	Remainder 2008 GALLONS	Non-Consumptive 2008 ACRE-FEET
53983	7	WESTAR ENERGY	WOLF CREEK GENERATING ST	6,860,042,000	1,749,808,000	5,110,234,000	15,683
53983	1	WESTAR ENERGY	JEFFERY ENERGY CENTER	6,368,428,197	1,582,293,000	4,786,135,197	14,688
53983	2	WESTAR ENERGY	LAWRENCE ENERGY CTR	1,582,293,000	276,439,000	1,305,854,000	4,008
53983	5	WESTAR ENERGY	GORDON EVANS ENERGY CTR	778,404,000	778,404,000	0	0
53983	4	WESTAR ENERGY	TECUMSEH ENERGY CTR	992,912,000	992,912,000	0	0
53983	8	WESTAR ENERGY	MURRAY GILL ENERGY CTR	745,672,000	745,672,000	0	0
53983	3	WESTAR ENERGY	HUTCHINSON ENERGY CTR	276,439,000	276,439,000	0	0
53983	9	WESTAR ENERGY	NEOSHO ENERGY CTR	0	0	0	0
9039	1	KCP&L	LA CYGNE POWER PLANT	2,330,223,000	2,330,223,000	0	0
4816	1	EMPIRE DIST	RIVERTON POWER PLANT	34,317,192,000	678,772,000	33,638,420,000	103,233
17607	1	SUNFLOWER ELEC	HOLCOMB PLANT	1,386,267,976	1,386,267,976	0	0
20297	1	KANSAS CITY	BOARD OF PUBLIC UTILITIES	68,564,743,000	37,315,000	68,527,428,000	210,303
				124,202,616,173	10,834,544,976	113,368,071,197	347,914

2008 Data
Water Power UMW

1680	1	BOWERSOCK MILLS & POWER CO	836,158

*These are mainly calculated quantities, generally at .00015 of total water diverted

JOINT COMMITTEE ON ENERGY AND ENVIRONMENTAL POLICY
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KANSAS
WATER OFFICE

Mark Parkinson, Governor
Tracy Streeter, Director

www.kwo.org

M E M O R A N D U M

DATE: October 8, 2010

TO: Joint Committee on Energy an Environmental Policy

FROM: Earl Lewis, Assistant Director

SUBJECT: Future Use Storage and Unfunded Liability

At the hearing yesterday there were several questions related to the future use storage the state of Kansas currently has under contract with the Corps of Engineers. The table below contains information on the current future use financial balance for each lake and the amount that will be due as a balloon payment at the end of the contract if we do not act before that time. The current balance could be paid off with a lump sum payment now, or by beginning amortized payments that would run through the end of the contract period. It is of course important to note that additional annual operation and maintenance cost will be incurred when storage is called into service. The estimated additional O&M costs are shown in the last column.

Finally, we are expecting and planning on calling additional storage in Clinton and Hillsdale into service before the end of the Corps of Engineers contract to meet growing demands in the region. In these cases, the amount of debt associated with storage planned to be called into service has been removed from the ending balloon payment in the following table.

	Balance October 1, 2010	Final Contract Year	Balloon or Balance at Term	Additional 2010 O&M with Future Use in Service
Perry	$ 16,246,554	2040	$ 39,966,434	$ 236,250
Milford	$ 16,949,180	2040	$ 36,951,533	$ 178,515
Big Hill	$ 9,246,929	2029	$ 19,139,647	$ 89,414
Clinton	$ 5,699,323	2027	$ 7,679,986	$ 92,411
Hillsdale	$ 35,659,311	2030	$ 51,037,921	$ 193,830
Total	**$ 41,358,634**		**$ 154,775,521**	**$ 790,420**

As mentioned yesterday, the City of El Dorado also has future use storage with the Corps of Engineers in El Dorado Reservoir. The best information that we have is that the current future use storage balance is $34.4 million and the balloon balance in 2041 would be $99.9 million.

JOINT COMMITTEE ON ENERGY AND ENVIRONMENTAL POLICY
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ATTACHMENT 38

901 S. Kansas Avenue, Topeka, KS 66612-1210 • Phone: (785) 296-3185 •