Approved: 3-22-2006
Date

MINUTES OF THE HOUSE ENVIRONMENT COMMITTEE

The meeting was called to order by Chairperson Joann Freeborn at 3:30 P.M. on February 9, 2006 in Room 231-N of the Capitol.

All members were present except:
Representative Pat George- excused

Committee staff present:
Raney Gilliland, Legislative Research Department
Lisa Montgomery, Revisor of Statutes Office
Pam Shaffer, Committee Secretary

Conferees appearing before the committee:
Dr. Lloyd Fox, Department of Wildlife and Parks
George Teagarden, Department of Animal Health
Craig Phillips, Chief of Conservation and Restoration Branch with Fort Riley
Ken Peterson, American Petroleum Institute
Ed Cross, Executive Vice President-Kansas Independent Oil & Gas Association
Maurice Korphage, Director of Kansas Corporation Commission, Conservation Division

Others attending:
See attached list.

Chairperson Freeborn asked for everyone to sign the guest list. She announced the agenda for next Tuesday, February 14, possible action on **HB2710 - Creates the water right transition assistance program** and **HB2716 - Granting of easement for diversion works on Kansas river for water district number 1 of Johnson county.**

Everyone was given a copy of the Committee minutes for January 10, 11, 17, 19, 24, 26 for everyone to look at and before the end of today's meeting, want to get approved. Copies of each of the following documents were given to each committee member: Fiscal note for **HB2757 - Requiring notification of oil and gas spills to landowners** (See attachment 1), Kansas Geological Survey - Ground Water Assessment in Association with Salt Cedar control, Report on Year One Activities. (See attachment 2).

Chairperson Freeborn introduced Dr. Lloyd Fox, Department of Wildlife, along with Goerge Teagarden, Department of Animal Health who gave a briefing on Chronic Wasting Disease in Deer. (See attachment 3) Chronic wasting disease (CWD) is a fatal disease of white-tailed deer, mule deer, elk and moose. CWD is classified as a transmissable spongiform encephalopathy (TSE). TSEs are diseases caused by abnormal forms of a protein called a prion. Symptoms of CWD in deer and elk include loss of body weight, shabby or poor coat condition with piloerection of hair along the backbone, drooping ears, excessive salivation and urination, unusual behavior including lack of response to people, head tremors, periods of apparent stupor and lack of coordination.

CWD was first identified as a syndrome in captive mule deer in Colorado in the late 1960's. The first cases of CWD identified in wild cervid populations occurred in 1981, 1985 and 1990 in elk, mule deer and white tailed deer, respectively.

CWD is not a disease that spreads rapidly through a population.

There is no confirmed evidence of a link between CWD and any disease or illness in humans.

Deer management plans and regulations will be evaluated relative to their effect on CWD during the annual regulation review process for 2006. Activities under consideration shall include:
1. Level of hunting pressure on deer and elk population, 2. Harvest that shift the age structure and/or sex ratios of herds, 3. Hunter restrictions on the transport of carcasses, 4. Hunter requirements for disposal of carcasses, 5. Prohibitions or restrictions on feed and baiting.

Questions and discussion followed the briefing.

Unless specifically noted, the individual remarks recorded herein have not been transcribed verbatim. Individual remarks as reported herein have not been submitted to the individuals appearing before the committee for editing or corrections.

MINUTES OF THE House Environment Committee at 3:30 P.M. on February 9, 2006 in Room 231-N of the Capitol.

Chairperson Freeborn introduced Craig Phillips, Chief of Conservation and Restoration Branch with Fort Riley, who gave a presentation on the Buffer Initiative. (See attachment 4). Encroachment management through use of Army Compatible Use of Buffers (ACUB). Key issues are encroachment concerns, ACUB solution and Fort Riley ACUB status. Encroachment is a word used in the army when things happen off of the installation that may affect the military mission. Urban development is encroaching upon Fort Riley. This included Manhattan's westward expansion, Riley's westward expansion, country homes on the western and southern boundaries.

Fort Riley's military population is projected to increase over 25,000 and additional civilian increases are estimated at up to 8,000. The regional housing shortage will be over 5,900 units by 2008. The army is not going to provide this housing, they are leaving this to the private sector developers.

Encroachment noise issues may impact firing capabilities, at the tank gunnery ranges. It also may impact road demolition training at range 52. Ranchettes west and south of Fort Riley will likely impact helicopter operations beyond the installation's boundary. Because helicopter traffic will increase this can become a serious issue.

Encroachment conservation issues include endangered species such as the Topeka Shiner. There can possibly be training restrictions if development reduces Topeka shiner numbers in Wildcat Creek. The Regal fritillary butterfly, henslow's sparrow and greater prairie chicken are other species of concern. Fort Riley has major breeding populations of these species. Development is removing prairie parcels north and west of Fort Riley, which could potentially cause training restrictions. These restrictions could hamper weapons firing practice because vehicle movement could possibly damage nests.

ACUB solution is to buffer areas around Fort Riley. This would be a partnership between Fort Riley and the Kansas Land Trust along with participation of willing landowners. This program does not put new land into Army inventory, but it supports objectives for open space and species habitat conservation.

Questions and discussion followed the presentation.

Chairperson Freeborn asked for a motion to approve the committee minutes, Representative Lukert stated his name was not spelled correctly. Representative Sloan moved to approve the minutes, with the spelling correction, Representative Olson seconded. Motion carried.

Chairperson Freeborn opened the hearing for **HCR5030 - Concurrent Resolution by Environment, Congress and President urged to allow offshore drilling for natural gas.**

Ken Peterson, American Petroleum Institute, proponent, testified. (See attachment 5).

Questions and discussion followed the testimony.

Chairperson Freeborn closed the hearing on **HCR5030.**

Chairperson Freeborn opened the hearing on **HB2757.**

Ed Cross, Executive Vice President-Kansas Independent Oil & Gas Association, proponent, testified (See attachment 6).

Written testimony from Erick Nordling, Southwest Kansas Royalty Owners Association, proponent, was given to each committee member (See attachment 7).

Maurice Korphage, Director of Kansas Corporation Commission, Conservation Division, neutral, testified. (See attachment 8).

Questions and discussion followed the testimony.

MINUTES OF THE House Environment Committee at 3:30 P.M. on February 9, 2006 in Room 231-N of the Capitol.

Chairperson Freeborn closed the hearing on **HB2757**.

Chairperson Freeborn adjourned the meeting at 5:45pm. The next meeting is Tuesday, Februrary 14th.

HOUSE ENVIRONMENT COMMITTEE GUEST LIST

DATE: 02/09/06

NAME	REPRESENTING
Craig Phillips	US Army, Ft Riley - Conservation
~~Roxanne~~ Miller	Kansas Land Trust
Tom Day	KCC
Amber Kallhoven	Rep. Dan Johnson
Steve Swaffar	Ks Farm Bureau
Lindsey Douglas	Hein Law Firm
Jessica Concannon	Student @ Washburn
John Warren	Student, Washburn
Allison Herring	KCC
Clint Goos	KCC
M.L. Korphage	KCC - Wichita
Ed Cross	KIOGA
~~Ken Peterson~~	Ks Petroleum Council
Doug Smith	SW Ks Royalty Owners Association
George Teagarden	KAHD
Mike Hayden	KDWP
Mike Beam	Ks Lvstk Assn.
Chris Tymeson	KDWP

HOUSE ENVIRONMENT COMMITTEE GUEST LIST

DATE: 02/09/06

NAME	REPRESENTING
LLOYD FOX	KDWP
Mike Reecht	Saches Braden
Dan Dall	Garden City

February 7, 2006

The Honorable Joann Freeborn, Chairperson
House Committee on Environment
Statehouse, Room 143-N
Topeka, Kansas 66612

Dear Representative Freeborn:

SUBJECT: Fiscal Note for HB 2757 by House Committee on Environment

In accordance with KSA 75-3715a, the following fiscal note concerning HB 2757 is respectfully submitted to your committee.

HB 2757 would require the Kansas Corporation Commission to adopt rules and regulations requiring oil and gas operators, in a timely way, to notify landowners of a spill, if it is also required to be reported to the Commission. Current law and regulations require only oil operators to notify the Commission of a spill in a timely way.

The Kansas Corporation Commission indicates the expense of adopting rules and regulations would be negligible and could be absorbed within existing resources.

Sincerely,

Duane A. Goossen

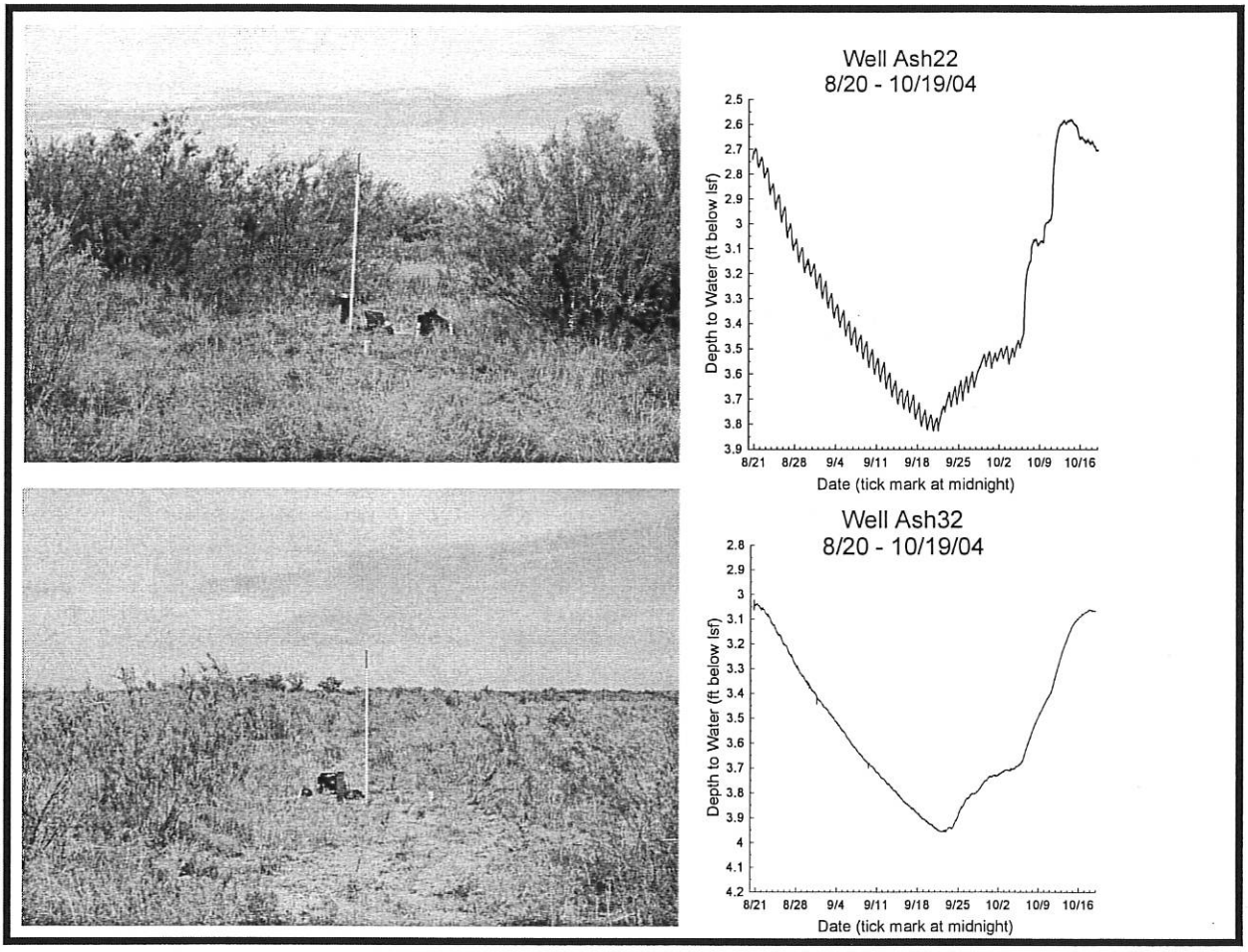
Duane A. Goossen
Director of the Budget

cc: Tom Day, KCC

House Environment Committee
February 9, 2006
Attachment 1

Kansas Geological Survey

GROUND WATER ASSESSMENT IN ASSOCIATION WITH SALT CEDAR CONTROL – REPORT ON YEAR ONE ACTIVITIES



James J. Butler, Jr., Donald O. Whittemore, and Gerard J. Kluitenberg

Prepared for the
Kansas Water Office

Kansas Geological Survey Open-File Report 2005-19
July 2005

House Environment Committee
February 9, 2006
Attachment 2

Project: Ground Water Assessment in Association with Salt Cedar Control
Duration: August 16, 2004 to June 30, 2005
Lead Investigator and Affiliation: James Butler, Kansas Geological Survey
Associated Investigators and Affiliations: Gerard Kluitenberg, Kansas State University, Donald Whittemore, Kansas Geological Survey
KWO Contract Number: 05-114 Total Funding: $20,637

EXECUTIVE SUMMARY

The primary objective of the work described here was to use water-table fluctuations to estimate the impact of various salt-cedar control activities on the ground-water resources of the Cimarron River alluvial aquifer at a site in Clark County. Previous work by this KGS/KSU research team has shown that diurnal fluctuations in the water table can be utilized both as a diagnostic indicator of phreatophyte activity and for quantifying ground-water consumption by phreatophytes. This contract was developed to extend the work of the research group to exploit an opportunity presented by a Kansas Alliance of Wetlands and Streams (KAWS) demonstration project focused on investigating the effectiveness of various salt-cedar control measures. Funding for this contract was provided by the Kansas Water Plan through the Kansas Water Office.

The KAWS demonstration project is being carried out in an area of salt-cedar infestation along the Cimarron River south of Ashland. Four experimental plots were established in pasture on the north side of the Cimarron River. One plot is used for monitoring background (unaltered) conditions, while the other three plots are for application of different salt-cedar control measures. Application of control measures began in mid-March of 2005 and is continuing.

Six shallow wells were installed in three of the experimental plots in August 2004. All wells have submersible pressure sensors to allow monitoring of water levels through time. Water-level data collected in the late summer and early fall of 2004, prior to any control activities and prior to salt-cedar dormancy, clearly demonstrate that the magnitude of the diurnal water-table fluctuations observed at a well is highly dependent on the vitality of the phreatophyte community in the vicinity of that well. Thus, the strategy of using water-table fluctuations to assess ground-water savings achieved from control activities appears to have considerable potential at this site.

Other hydrologic data are being collected as part of this work. A weather station was installed in October 2004 to monitor meteorological conditions and provide estimates of the potential for evapotranspiration. A neutron-probe access tube was installed adjacent to each well in August 2004 to monitor the moisture content above the water table.

The application of salt-cedar control measures is ongoing. As of this report, plots have been cleared of salt cedar except for circles around each well. Those circles will be gradually reduced until all vegetation is eliminated in July of 2005. After all the salt cedar and other phreatophytes have been removed, monitoring will continue in order to evaluate the ground-water savings gained through the control activities. However, short-term monitoring will only provide information about short-term gains. Longer-term monitoring is critical for assessing the ultimate ground-water savings gained through the control activities. Modest funding for that additional monitoring has been requested from the Kansas Water Office.

INTRODUCTION

Consumption of ground water by phreatophytes in riparian corridors is thought to be one factor responsible for stream-flow reductions in the Cimarron Basin and elsewhere in western Kansas. Extensive phreatophyte-control measures, primarily focusing on invasive species such as salt cedar (*Tamarix* spp.) and Russian olive (*Elaeagnus angustifolia*), are being considered in response to concerns about the impact of phreatophytes on surface- and ground-water resources. At present, there is no generally accepted means of quantifying the ground-water savings that might be gained through these control measures. Recently, a team of Kansas Geological Survey (KGS) and Kansas State University (KSU) researchers have shown that diurnal fluctuations in the water table can be utilized both as a diagnostic indicator of phreatophyte activity and for quantifying ground-water consumption by phreatophytes (Butler et al., in review). This Kansas Water Office (KWO) contract was directed at extending that previous work to assess the use of water-table fluctuations as a tool for quantifying ground-water savings achieved through phreatophyte control measures.

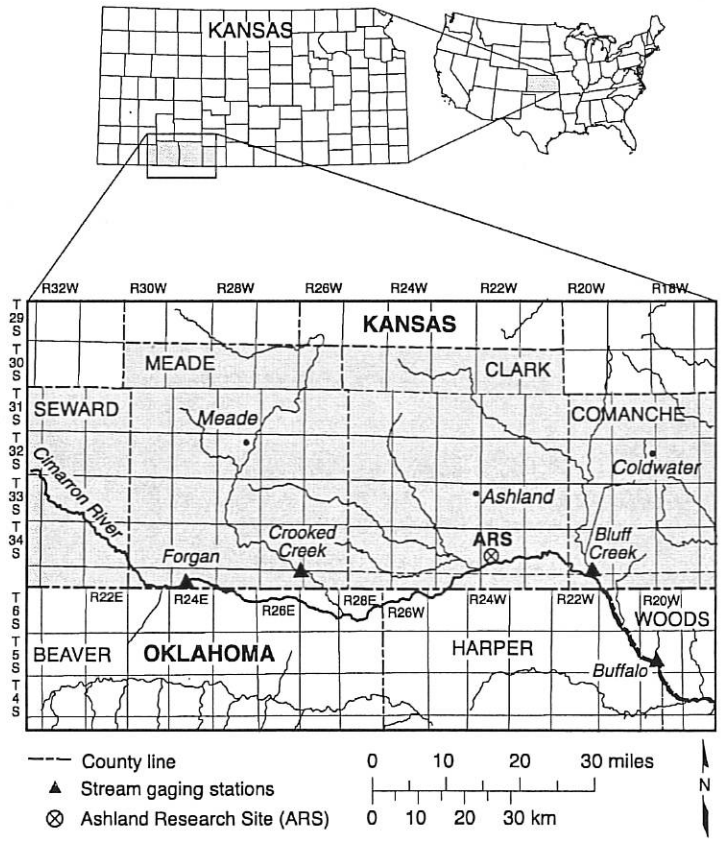
The KWO contract was developed to exploit an opportunity presented by a Kansas Alliance of Wetlands and Streams (KAWS) demonstration project focused on investigating the effectiveness of various salt-cedar control measures. The demonstration project is being carried out in an area of salt-cedar infestation along the Cimarron River south of Ashland, Kansas (Figure 1). Four experimental plots have been established on the north side of the Cimarron River on pasture of the Arnold Ranch (Figure 2). One area (Plot 1) is to remain unaltered during the project, while different salt-cedar control measure will be applied in the other three areas. The salt cedar will be cut and chemically treated in Plot 2, repeatedly cut in Plot 3, and cut and burned in Plot 4.

The Arnold Ranch has been owned and operated by the Arnold family since its establishment in the late 1800s. According to the Arnold family, salt cedar was first noted on their ranch after the flood of 1939. The salt cedar sprouted on the wet sand deposited by that flood and its distribution across the area has changed little since then. Dave Arnold clear cut Plots 1-3 in the fall of 1996. The heterogeneous pattern of salt cedar and Russian olive growth observed in Plots 1-3 at the start of this project (mid-August 2004) was not a function of how the plots were cut in 1996. That distribution was most likely a reflection of spatial variations in underlying soil conditions.

In the reporting period for this contract, six wells equipped with submersible pressure sensors were installed in Plots 1-3 in order to monitor water-table responses in the vicinity of the most common phreatophyte communities at the site (wells were not placed in Plot 4 because of concerns about possible well damage from the planned burning). A neutron-probe access tube was emplaced adjacent to each well so that water content in the vadose zone (interval between the water table and the land surface) could also be measured. A weather station was installed on the north end of Plot 3 to monitor meteorological conditions and provide estimates of the potential for evapotranspiration. Water-level data collected in the late summer and early fall of 2004, prior to any control activities and prior to salt-cedar dormancy, clearly demonstrate that the magnitude of the diurnal water-table fluctuations observed at a well is highly dependent on the apparent vitality of the phreatophyte community in the vicinity of that well (Figures 3a-b). Thus, the initial data indicate that the strategy of using water-table

fluctuations to assess ground-water savings gained from control activities appears to have considerable potential at this site.

Application of salt-cedar control measures began in March 2005 (Figures 4a-c). At that time, plots 2-4 were clear cut except for circles ranging from 70-100 ft in radius about the four monitoring wells in Plots 2 and 3. The radii of those circles of vegetation were reduced to 45 ft at three of the four wells on June 3, 2005. The vegetation was completely cleared about well Ash32 on June 3 because of the lack of any plant-induced water-table responses at that well since the start of monitoring in August 2004 (Figure 3b). The circles at the other three wells in Plots 2 and 3 were reduced to 22 ft on June 27, 2005. Two weeks later, all plants except one will be cut in the three remaining circles. In approximately another two weeks, the final plant in each plot will be removed. After the control measures have been fully applied, water-level data from the treated plots will be compared to data from the untreated area (Plot 1). That comparison should enable quantification of reductions in ground-water consumption produced by those measures. Note that a number of tasks not funded by this contract were also performed by the KGS/KSU research team in order to increase the value of the project results. For example, data on vegetation within the experimental plots were not obtained as originally planned by cooperators on the KAWS project. Thus, the research team decided to collect vegetation data on its own as the circles about the wells were reduced below 45 ft in radius. That vegetation inventory is ongoing so the results will be presented in a subsequent project report.



2-4

Figure 1 – Location map of the Ashland Research Site (ARS). The Ashland Research Site is the KGS designation for the area on the Arnold Ranch in which the work described in this report was carried out.

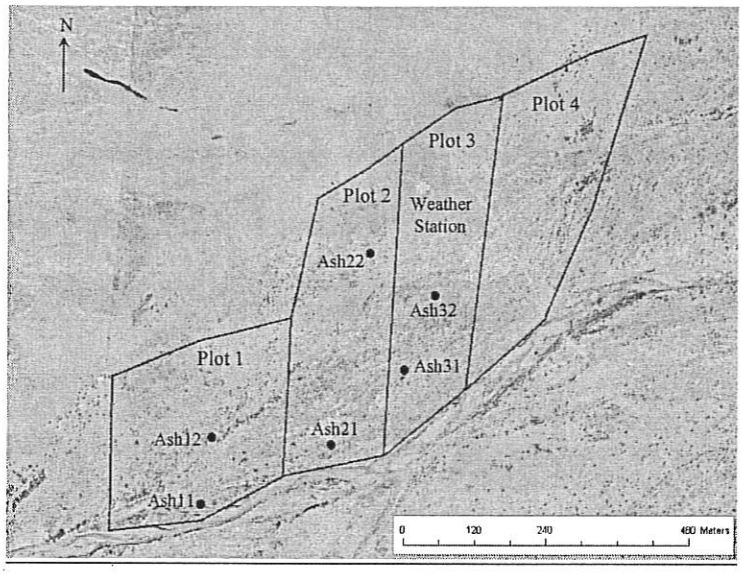
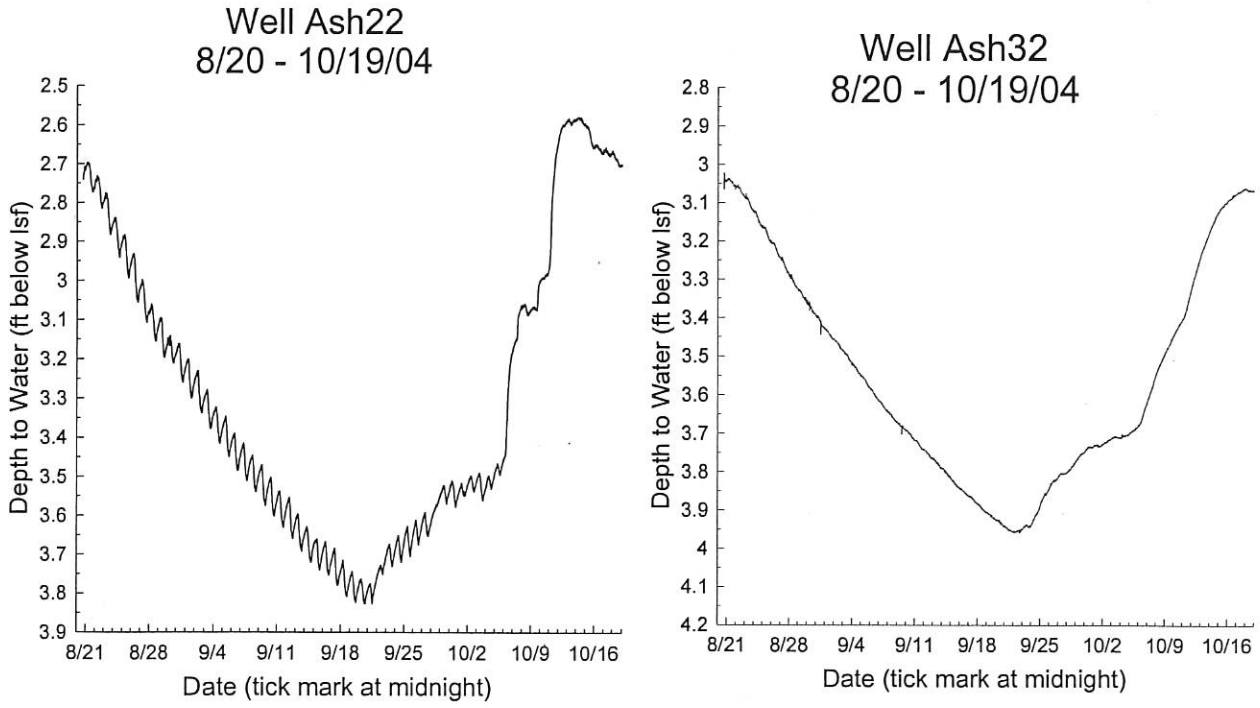


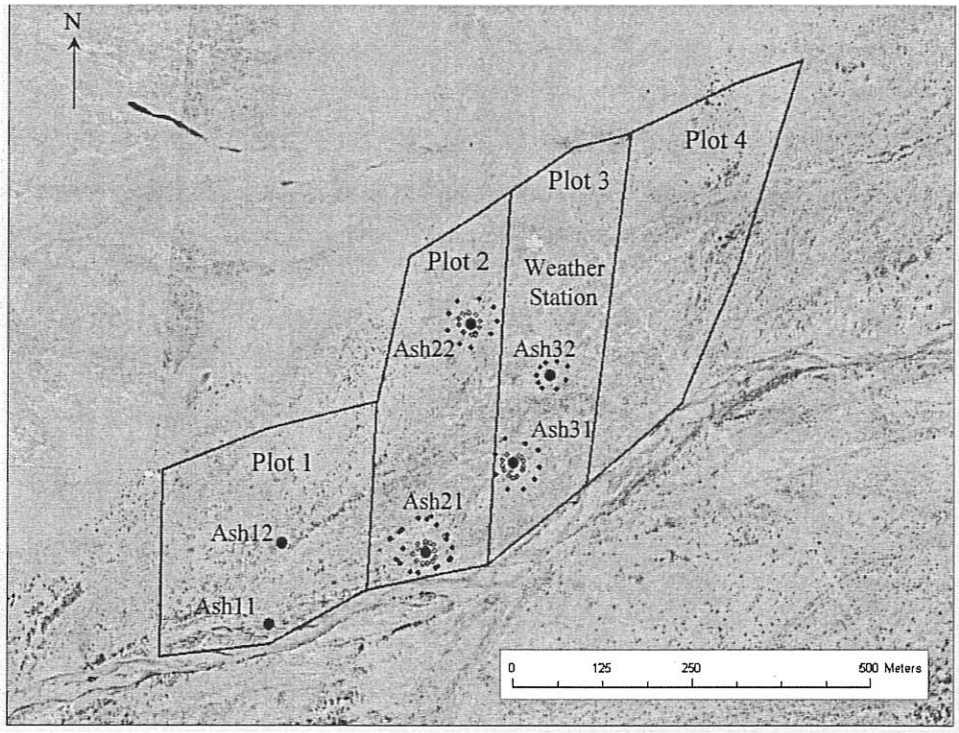
Figure 2 – Aerial photo of Ashland Research Site with locations of the experimental plots, monitoring wells, and weather station.

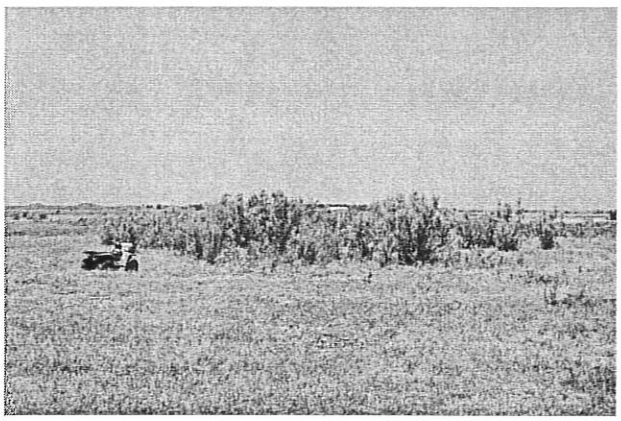


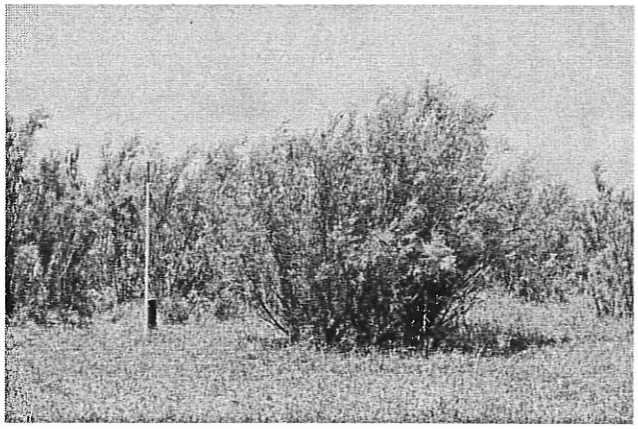
a **b**

Figure 3 - Depth to water recorded in two wells at the Ashland Research Site prior to application of salt-cedar control measures. Well Ash22 (a) is located in an area of vigorous salt cedar growth, while well Ash32 (b) is located in an area of stunted salt cedar. Note that the length of the interval represented by the y-axis is the same for both plots.

a







b **c**

Figure 4 – a) Aerial photo of Ashland Research Site with boundaries of vegetation circles remaining after mid-March 2005 and June 3, 2005, cuttings (circle boundaries recorded with handheld GPS unit; vegetation completely cleared around well Ash32 on June 3); b) Photo (6/16/05) of vegetation circle around well Ash22 following June 3rd cutting (view looking north, ATV on left for scale, pole visible at center of plot is 8.5 ft in height; note remnants of cut salt cedar in foreground); c) Photo (6/16/05) of large salt cedar that will remain as the single plant near well Ash22 (red tape used to indicate plants that should remain following next cutting to reduce the circle to 22 ft in radius).

2-7

REPORT OVERVIEW

The following report is divided into two main sections: 1) Installation of the Monitoring Network; and 2) Data Management, Processing, and Preliminary Analysis. The first section describes approaches used to design and install the monitoring wells and the neutron-probe access tubes, and the equipment utilized to monitor hydrologic and meteorological conditions at the site. The second section describes data management and processing procedures, presents a sample of the water-level data that have been collected in the project, discusses some problems affecting the quality of the water-level data, and summarizes the procedures for and initial results from the neutron logging.

INSTALLATION OF THE MONITORING NETWORK

The first four tasks listed in the scope of work outlined in the KWO contract involved installation of the monitoring network. Those tasks and the date on which they were completed are as follows:

Task 1 - Installation of monitoring wells – August 20, 2004
Task 2 - Installation of neutron-probe access tubes – August 20, 2004
Task 3 - Installation of water-table monitoring equipment – August 20, 2004
Task 4 – Installation of weather station – October 19, 2004

Each of these tasks is described in this section.

Tasks 1 and 2 – Installation of monitoring wells and neutron-probe access tubes

As soon as the KWO contract was formally activated (August 16, 2004), KGS and KSU personnel traveled to the Arnold Ranch to install the monitoring wells and neutron-probe access tubes. This installation work was done August 17-20, 2004. Well locations were based on a qualitative survey of vegetation patterns in each plot by members of the KGS/KSU research team; an attempt was made to place wells in the vicinity of typical phreatophyte groupings found over the area. Prior to well installation, six direct-push electrical-conductivity (EC) profiles were performed to assess the water-table position and shallow stratigraphy at each well site. At each location, EC logging (see Butler et al. [1999] and Schulmeister et al. [2003] for a description of direct-push EC logging) was performed to a depth of approximately 23 ft below land surface (lsf) with the KGS Geoprobe machine. After review of the EC log, a 2-in ID PVC well was installed in the EC hole using the Geoprobe machine. The screened interval of all the wells was relatively long to allow specific conductivity profiling (an activity not funded by this contract) to be carried out. An additional factor influencing the length of the screened interval was the uncertainty regarding the vertical range over which the water table might vary through time. In the absence of any data, the decision was made to err on the side of caution and use relatively long screens. Note that a long screened interval may serve as a preferential flowpath to bring water up to meet the demands of the salt cedar and other phreatophytes, so it may diminish the observed water-table fluctuations. We are currently examining the potential of this mechanism to introduce bias into the collected data. Installation was completed by placing a metal surface casing over the PVC well. Following installation, the well was pumped and surged using a suction pump. When the turbidity of the water no

longer changed after surging, a water sample was taken and placed on ice (note that water sampling was not an activity funded by this contract).

A neutron-probe access tube was installed a few feet from each well. A pilot hole of a diameter slightly smaller than the outer diameter of the neutron-probe access tube was first made with the Geoprobe machine, after which the tube was pounded into the hole using a cathead arrangement. Neutron-probe access tubes were constructed from 1.5-in Schedule 40 PVC tubing (1.90-in OD). At one end, the access tubes were fit with a well point to allow insertion into the soil and to prevent water entry. The well points were fabricated (Environmental Manufacturing Inc.) from PVC rod and threaded onto the end of the access tubes. This threaded connection was further secured with PVC cement. Approximately 0.5 ft of tubing remained above the soil after installation. Local soil material was packed around the tube at the soil surface to provide a seal. After an access tube was installed, it was closed with a rubber stopper to prevent water entry from above. A cover fabricated from a PVC end-cap and a short length of PVC tubing were also placed over each tube to further limit water entry.

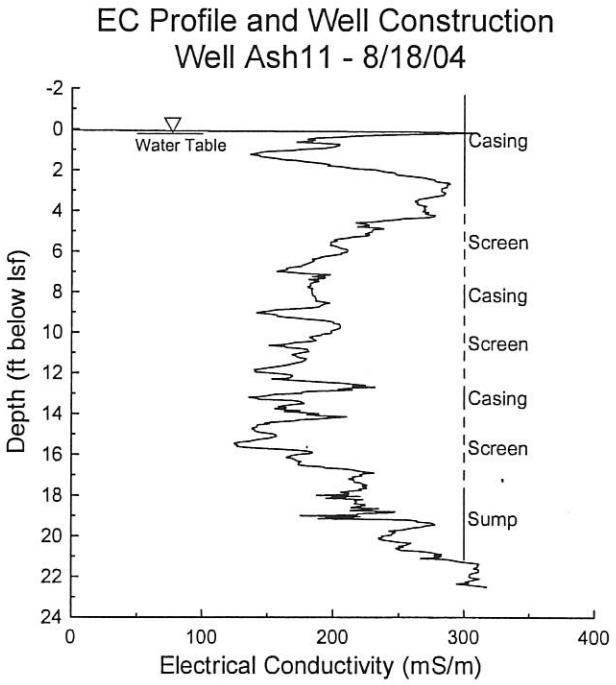
A description of each well site is given in the following subsections. Table 1 provides well-completion information and associated data for each well. Note that in the absence of a nearby surveyed benchmark, the top of casing (TOC) elevation for each well was measured with respect to TOC at well Ash11.

Well	Total depth from lsf (ft)	TOC above lsf (ft)	Screened interval wrt lsf (ft)	Sump interval wrt lsf (ft)	Sensor type and serial number	Lateral distance to neutron-probe access tube (ft)	Latitude (deg)	Longitude (deg)	Elevation of TOC above Ash11 TOC (ft)	Height of pole above lsf (ft)
Ash11	21.11	1.7	3.29-18.06	18.06-21.11	Troll 9000 - #31947	3.35	37.0439	99.7569	0.000	8.33
Ash12	21.12	1.69	3.29-18.08	18.08-21.12	miniTroll - #15936 baroTroll - #16977	4.20	37.0449	99.7567	3.251	8.33
Ash21	21.16	1.64	3.32-18.09	18.09-21.16	miniTroll - #17162	4.1	37.0448	99.7544	1.193	7.17
Ash22	21.07	1.73	3.32-18.04	18.04-21.07	miniTroll - #17156	4.49	37.0477	99.7537	1.071	8.5
Ash31	21.17	1.65	3.32-18.11	18.11-21.17	miniTroll - #17201	4.72	37.046	99.753	0.021	7.33
Ash32	21.11	1.69	3.19-17.97	17.97-21.11	miniTroll - #16940 baroTroll - #17026	4.72	37.0471	99.7525	0.951	8.25

Table 1 – Well-completion details and associated information for monitoring wells (all wells constructed with 2-in ID Sch40 PVC casing and screen (10-slot [0.01 in]); latitude and longitude of wells determined with high-accuracy KGS GPS surveying system, relative TOC elevations determined with same system; lsf and wrt are abbreviations for " land surface" and "with respect to", respectively).

Well Ash11

This well site is located near the south edge of Plot 1 in a low-lying area of dense salt cedar near the Cimarron River (Figure 5a). The water table was within 0.3 ft of the land surface at the time of installation and remained close to the surface for most of the monitoring period due to the proximity of the Cimarron River. Figure 5b displays the EC log obtained at the site and relevant well-completion information. The well is screened from 3.3-18.1 ft below lsf. It appears that the top of the screen is in a zone with some clay. The interval from 6-16 ft, however, appears to have little clay and is thought to consist primarily of sand. The relatively high EC (for sand) values in that interval are a product of the high specific conductance of the ground water (sample collected 8/18/04: 10,000 μS/cm at 25 deg C = 1,000 mS/m in units of EC log) with very little matrix contribution.



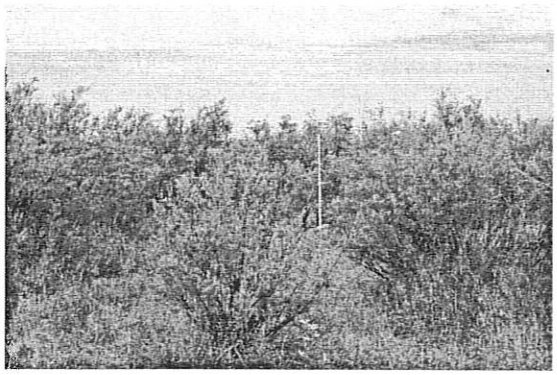
a **b**

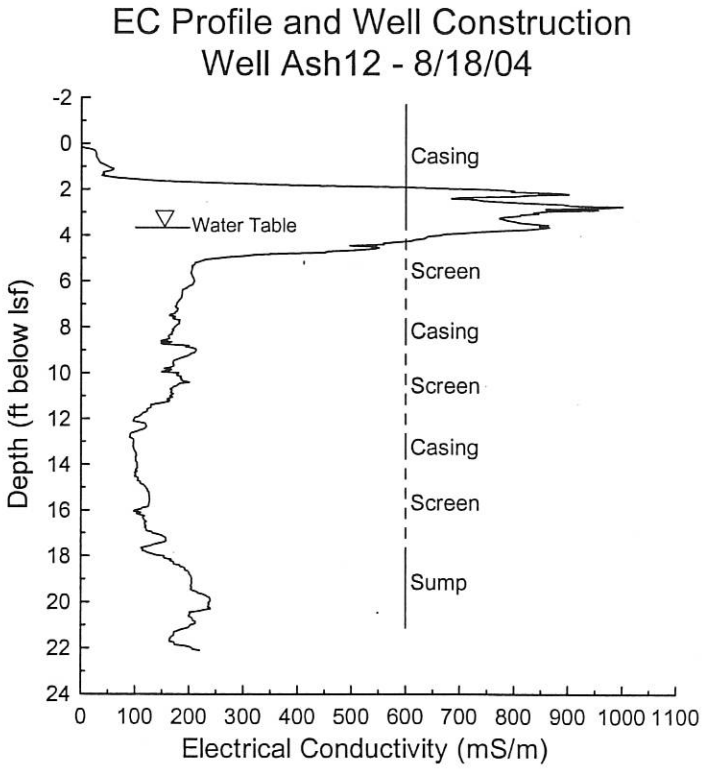
Figure 5 – Photograph (a) and EC log (b) for Ash11 well site (see Table 1 for further well information; photograph taken on 8/31/04).

2-10

Well Ash12

This well site is located near the center of Plot 1 on a terrace above the Cimarron River in the densest growth of salt cedar observed on the site (Figure 6a). The water table was 3.7 ft from the land surface at the time of installation. Figure 6b displays the EC log obtained at the site and relevant well-completion information. The well was screened from 3.3-18.1 ft below lsf. It appears that the top of the screen is in the lower portions of a clay-rich zone that extends from 1.5-5 ft below lsf. The interval from 6-11 ft is characterized by an approximately constant EC and is thought to consist primarily of sand with small amounts of fine material. The relatively high (for sands) EC values in that interval are primarily a product of the high specific conductance of the ground water (sample collected 8/18/04: 7,740 µS/cm at 25 deg C = 774 mS/m in units of EC log). Later specific conductance profiling found that the drop in EC at about 11 ft is not caused by a change in fluid EC. The most likely cause of that drop is a decrease in porosity and/or clay content.





a **b**

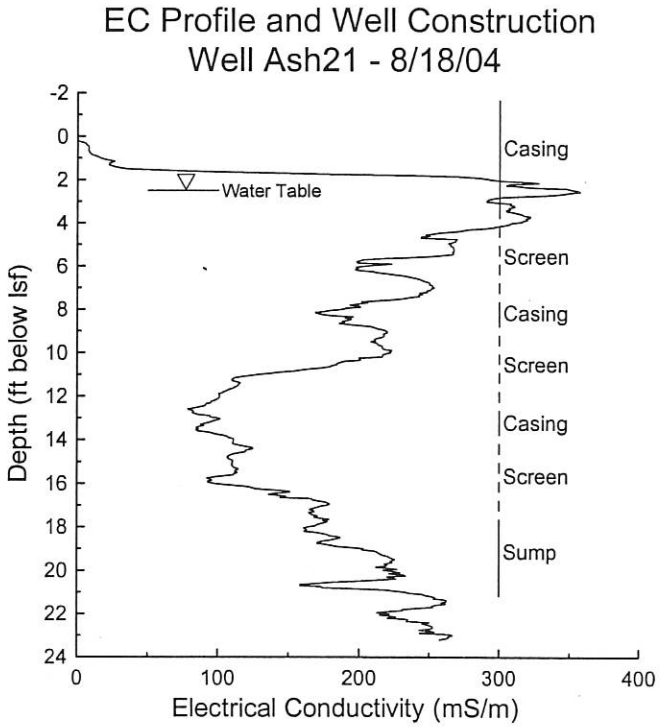
Figure 6 – Photograph (a) and EC log (b) for Ash12 well site (see Table 1 for further well information; photograph taken on 8/31/04).

2-11

Well Ash21

This well site is located near the southern boundary of Plot 2 on the first terrace above the Cimarron River. The well is in an area of salt cedar and Russian olive (Figure 7a) that occur in a thin band across the southern portions of Plot 2; the Russian olive at the back right of the clearing in Figure 7a was one of the largest trees found on the four plots. The water table was 2.4 ft from the land surface at the time of installation. Figure 7b displays the EC log obtained at the site and relevant well-completion information. The well was screened from 3.3-18.1 ft below lsf. It appears that the top of the screen is in a zone with some clay that extends from 1.5-4.5 ft below lsf. The interval from 5.5-10 ft is thought to be sand. The relatively high (for sands) EC values in that interval are primarily a product of the high specific conductance of the ground water (sample collected 8/19/04: 8,890 µS/cm at 25 deg C = 889 mS/m in units of EC log) with minor matrix contribution. Later specific conductance profiling found that the lower EC values from 11-16 ft are not caused by a change in fluid EC. The most likely causes of that drop are a decrease in porosity and/or clay content similar to that suspected at well Ash12. Similarly, the increase in EC from 16-18 ft is not caused by a change in fluid EC and is most likely a result of an increase in porosity and/or clay content.

a



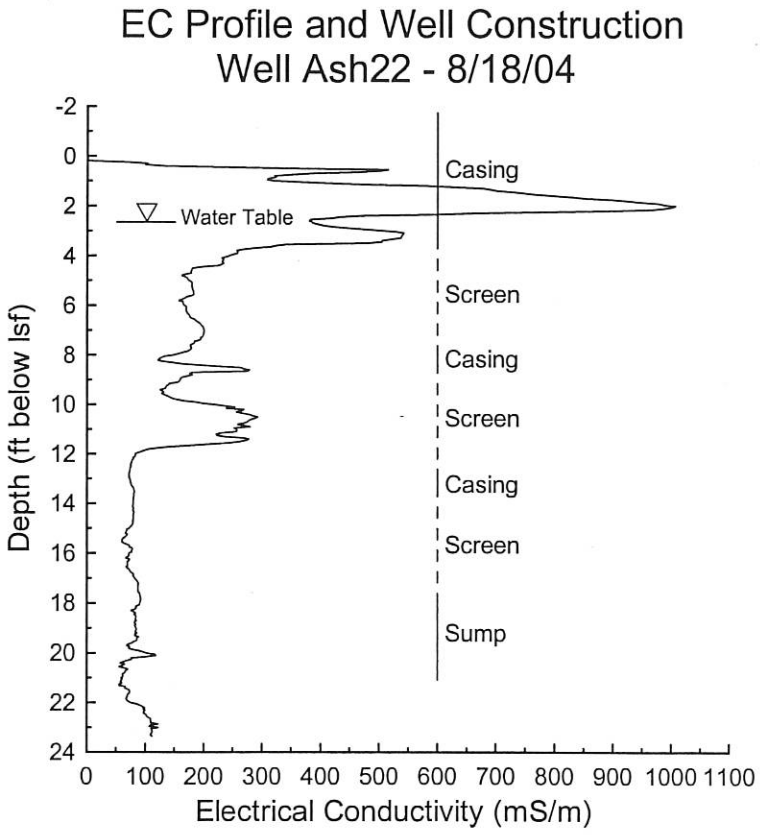
b

2-12

Figure 7 – Photograph (a) and EC log (b) for Ash21 well site (see Table 1 for further well information; photograph taken on 8/31/04).

Well Ash22

This well site is located in the northern half of Plot 2 in an area of large thriving clumps of salt cedar (Figure 8a). These salt cedar are the largest and healthiest looking in the four plots. The water table was 2.7 ft from the land surface at the time of installation. Figure 8b displays the EC log obtained at the site and relevant well-completion information. The well was screened from 3.3-18.0 ft below lsf. There are three distinct segments to the EC log. The top of the screen appears to be in a zone of high EC that extends from 0.5-4 ft below lsf. The interval from 4-11.5 ft is characterized by relatively constant EC and is thought to consist primarily of sand with some clay. The relatively high (for sands) EC values in that interval are a product of the high specific conductance of the ground water (sample collected 8/19/04: 5,100 µS/cm at 25 deg C = 510 mS/m in units of EC log) with additional matrix contribution. Specific conductance profiling found that the lower EC values below 11.5 ft are not caused by a change in fluid EC. The most likely cause of that drop is a decrease in porosity and/or clay content similar to that suspected at wells Ash12 and Ash21.



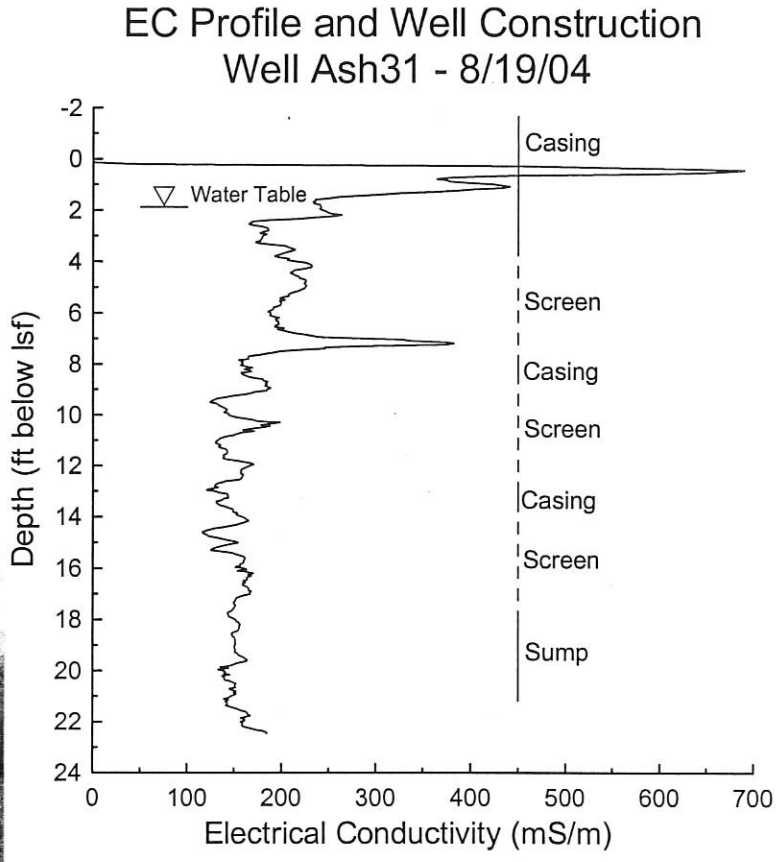
a b

Figure 8 – Photograph (a) and EC log (b) for Ash22 well site (see Table 1 for further well information; photograph taken on 8/31/04).

Well Ash31

This well site is located in a low-lying area in the southern half of Plot 3. The site is in a thin band of salt cedar and Russian olive (similar to well Ash21) that extends across Plot 3 (Figure 9a). The water table was 1.9 ft from the land surface at the time of installation. Figure 9b displays the EC log obtained at the site and relevant well-completion information. The well was screened from 3.3-18.1 ft below lsf. There are three distinct segments on the EC log. There is a zone of high EC that extends from the surface to about 1.5 ft below lsf. The top of the screen is in an interval that extends 2-7.5 ft below lsf that is characterized by a relatively constant EC and is thought to consist primarily of sand with some finer material. The relatively high (for sands) EC values in that interval are a product of the high specific conductance of the ground water (sample collected 8/19/04: 7,000 µS/cm at 25 deg C = 700 mS/m in units of EC log) with some matrix contribution. Specific conductance profiling found that the lower EC values below 7.5 ft are not caused by a change in fluid EC. The most likely cause of that drop is a decrease in porosity and/or clay content similar to that suspected at wells Ash12, Ash21, and Ash22. The EC decrease, however, is smaller than that observed at the other wells.

a



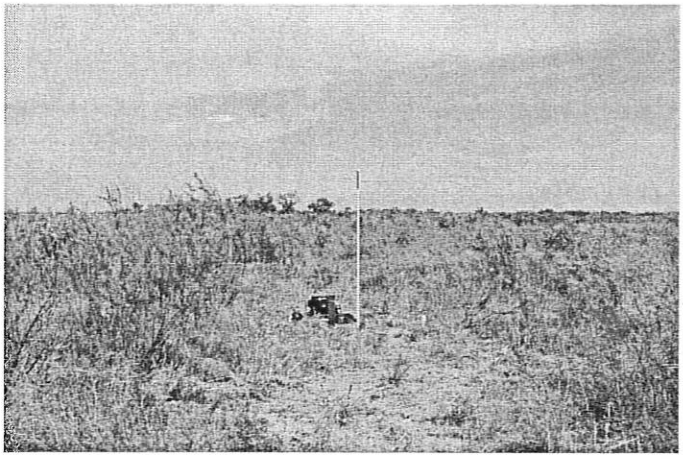
b

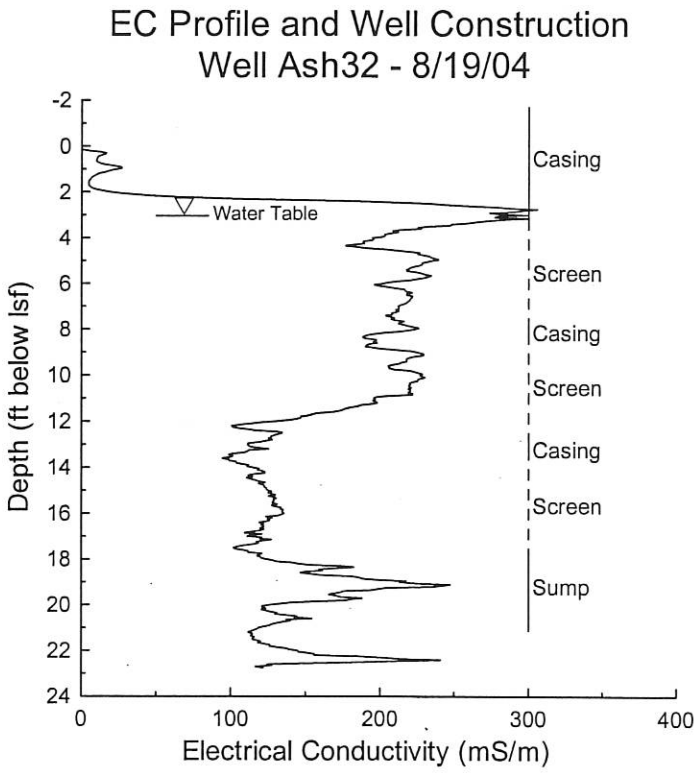
Figure 9 – Photograph (a) and EC log (b) for Ash31 well site (see Table 1 for further well information; photograph taken on 8/31/04).

15

Well Ash32

This well site is located in the middle of Plot 3 in a zone of diminutive and sickly looking salt cedar that stretches across all four plots (Figure 10a). The water table was 3.0 ft from the land surface at the time of installation. Figure 10b displays the EC log obtained at the site and relevant well-completion information. The well was screened from 3.2-18.0 ft below lsf. There are four distinct segments on the EC log. A zone of very low EC, most likely indicative of dry sand, extends from the surface to a depth of 2 ft. A zone of higher EC caused by salt accumulation and/or a higher clay content extends from 2 to 3.5 ft below lsf with the top of the screen near the bottom of that zone. A zone of relatively constant EC extends from 3.5 to 11 ft below lsf and is thought to consist primarily of sand with lesser amounts of clay. The relatively high (for sands) EC values in that interval are a product of the high specific conductance of the ground water (sample collected 8/19/04: 8,260 µS/cm at 25 deg C = 826 mS/m in units of EC log) with some matrix contribution. A zone of lower EC extends to the bottom of the screen. Specific conductance profiling found that the lower EC values below 11 ft are not caused by a change in fluid EC. The most likely cause of that drop is a decrease in porosity and/or clay content similar to that suspected at all the other wells except Ash11.





a **b**

Figure 10 – Photograph (a) and EC log (b) for Ash32 well site (see Table 1 for further well information; photograph taken on 8/31/04).

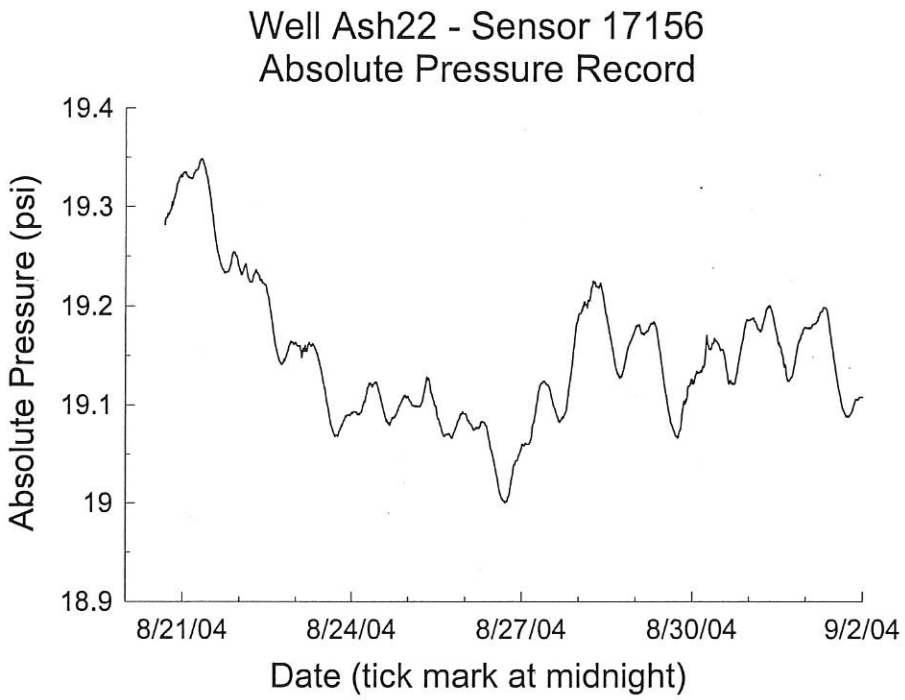
16
2-A

Task 3 – Installation of water-table monitoring equipment

All wells except Ash11 have an integrated pressure-transducer and datalogger unit submerged in the water column (30 psi absolute-pressure miniTroll, In-Situ, Inc.). This unit measures and records the pressure exerted by the overlying column of water and the atmosphere. Ash11 has a more sophisticated sensor (Troll 9000, In-Situ, Inc.) that measures the specific conductance and temperature of the ground water, as well as the pressure exerted by the overlying column of water and the atmosphere. Pressure readings are taken every 15 minutes in all wells and checked periodically with manual depth-to-water measurements (biweekly during the summer months and bimonthly otherwise). The temperature and specific conductance of the ground water at well Ash11 are measured at that same 15-minute interval and sensor operation is checked periodically using a hand-held specific-conductance and temperature meter (Model 30 Conductivity and Temperature Probe, YSI). As of the end of this reporting period, all sensors appeared to be performing well.

Absolute-pressure sensors were used in the wells instead of gage-pressure sensors in order to prevent sensor damage (via water movement down the vent tube of a gauge-pressure sensor) in the case a well is overtopped during high river stages. The Cimarron River overtopped Ash11 at least twice during this reporting period and reached the base of well Ash31 on at least one occasion (observations by the research team and Dave Arnold), demonstrating the need for absolute-pressure sensors in those wells. In order to compute the height of the overlying column of water (and thus the position of the water table) from the absolute-pressure measurement, the atmospheric-pressure component of that measurement must be removed. Atmospheric pressure is measured at the same 15-minute interval using two on-site barometers (baroTroll, In-Situ, Inc.) placed in the air column above the water table in wells Ash12 and Ash32. Figures 11a-b display records from the sensor in well Ash22 prior to and after the barometric pressure correction, respectively. Because of unanticipated problems with the barometers at wells Ash12 and Ash32 discussed in a later section, an additional barometer was placed in the weather station near the end of the reporting period.

a



b

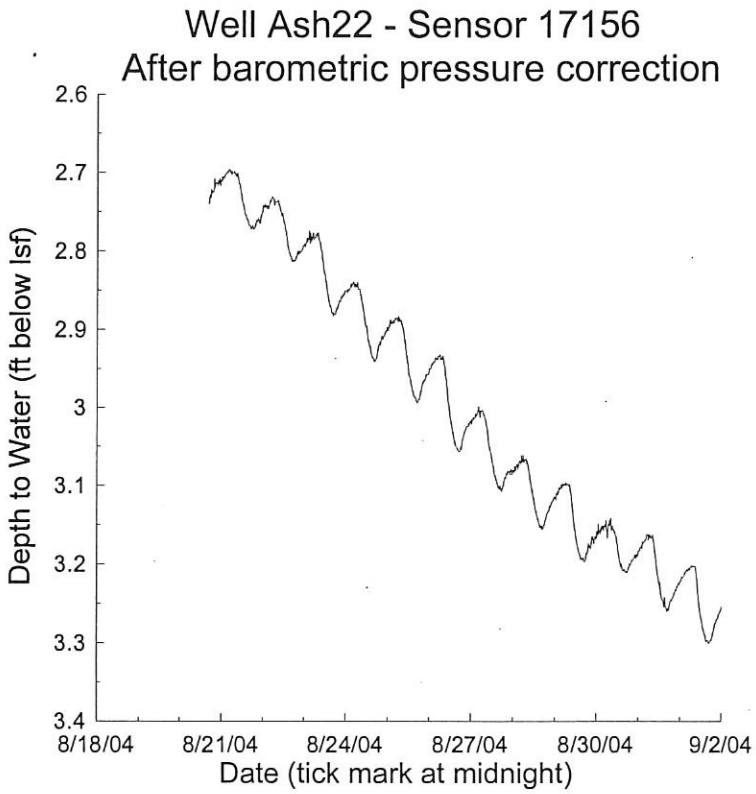


Figure 11 - a) Absolute-pressure record from sensor (17156) in the water column in Ash22; b) Depth to water at well Ash22 calculated after atmospheric-pressure component is removed from Ash22 sensor using barometer (sensor 16977) in air column at well Ash12.

18
2-18

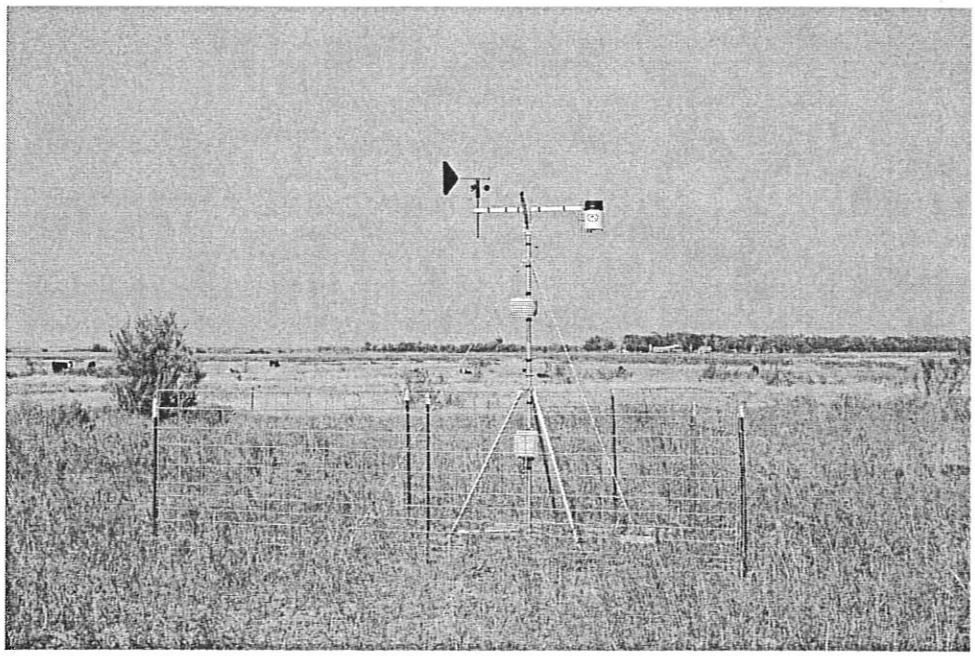
Task 4 – Installation of weather station

A weather station (Hobo Weather Station, Onset Computing Corp.) that measures and records a suite of meteorological data (air temperature, precipitation, relative humidity, solar radiation, and wind speed and direction) was installed on high ground in the northern portion of Plot 3 (Figures 2 and 12) on October 19, 2004. On June 2, 2005, a barometer was added to the weather station. Data are collected at 15-minute intervals and are the ending values (air temperature, relative humidity, solar radiation, and barometric pressure), averages (wind speed and direction), or summation (precipitation) for that 15-minute interval.

Prior to installation at the Ashland site, the weather station was set up adjacent to an existing weather station at the Larned Research Site from 9/24/04 to 10/18/04 in order to assess the new station and its sensors. That assessment indicated that all sensors were operating well (i.e. sensor readings compared favorably with the readings from existing sensors at the Larned station). After installation at the Ashland site, the tipping-bucket precipitation gauge has periodically been checked through comparisons with a National Weather Service standpipe precipitation gauge mounted on the fence in the front yard of Dave Arnold's home approximately a mile north of the station (Figure 12a). Another standpipe precipitation gauge was obtained from the National Weather Service at the end of this reporting period for mounting adjacent to the weather station. In the last month of the reporting period, a hand-held unit for measuring air temperature, relative humidity, wind speed, and atmospheric pressure (Kestrel 3500 Pocket Weather Meter, Nielsen Kellerman Inc.) was obtained so that sensor operation could be checked during each site visit by the research team. Previous work at the Larned Research Site had found that the relative humidity sensor is the most likely sensor to malfunction. An additional relative humidity sensor was therefore purchased. This new sensor was configured so that it could be periodically brought to the station and left for a few weeks to check the operation of the station's relative humidity sensor. As of the end of this reporting period, all meteorological sensors appear to be operating well.

In order to enable timely assessments of weather conditions at the Ashland site, a radio modem (Onset Computing Corp.) was added to the weather station in the final weeks of the reporting period. This modem and an accompanying base station in Dave Arnold's home will allow the weather station to be programmed to send meteorological data via email at a user-defined interval. These data will also be sent to the National Weather Service in Dodge City to fill their data gap in this portion of Clark County.

a



b

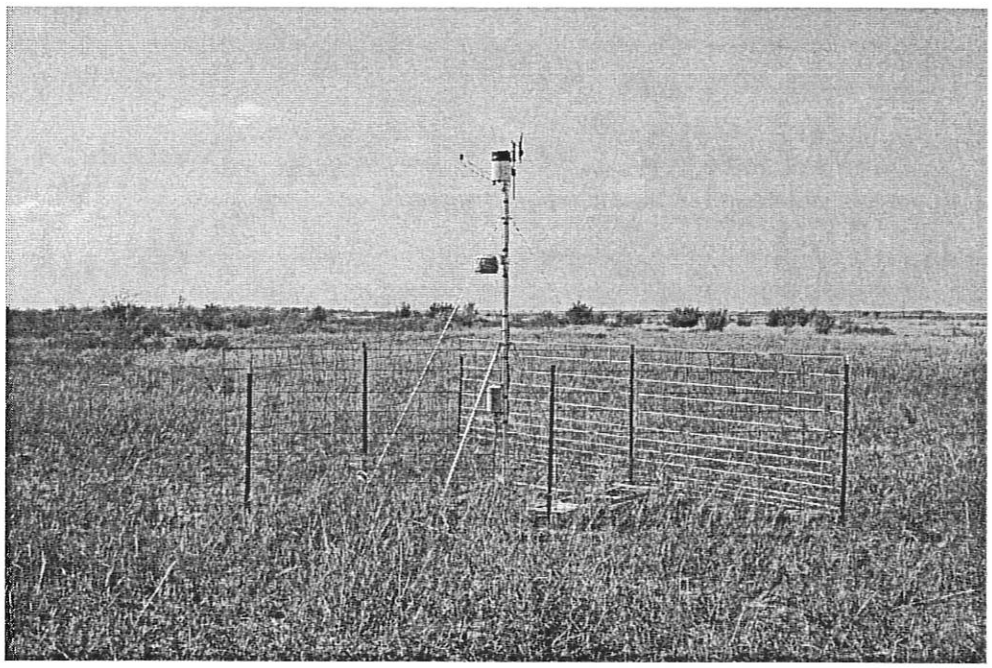


Figure 12 – Weather station at Ashland viewed from the south (a) and east (b). Tipping-bucket rain gage is on the right end of cross bar in photograph (a), while wind-speed and direction sensors are on left end of same cross bar. Solar radiation sensor (pyranometer) is on slanted arm extending outward to the south (left) near top of weather station in photograph (b). Relative humidity and temperature sensors are in radiation shield at an elevation of two meters above lsf. Barometer is inside datalogger housing located on main pole below point where support legs connect to main pole. Dave Arnold home is in the distance in the center right of photograph (a).

DATA MANAGEMENT, PROCESSING, AND PRELIMINARY ANALYSIS

The second four tasks listed in the scope of work outlined in the KWO contract involved the management, processing, and analysis of the pressure-sensor, weather-station, and neutron-probe data. Those tasks, all of which are ongoing and will continue through the life of the project, are as follows:

Task 5 - Download data from pressure sensors and weather station
Task 6 - Processing and analysis of pressure-sensor and weather-station data
Task 7 - Neutron logging
Task 8 – Processing of neutron logging

Each of these tasks is described in this section.

Task 5 – Download data from pressure sensors and weather station

The eight sensors (five absolute-pressure miniTrolls, one Troll 9000, and two baroTrolls) used for water-level monitoring are downloaded each time the research team visits the site. Those visits are approximately every two weeks during the growing season and once every month or two at other times. Downloading is done using a hand-held (Rugged Reader, In-Situ Inc.) or laptop computer. Cables and software for downloading the sensors have also been provided to Dave Arnold and he has helped download during the winter. Each time the sensors are downloaded, the status of the internal batteries and internal memory are checked. Low (<30 % capacity) batteries are changed. If the amount of occupied memory appears to be significantly increasing download time, the memory is cleared. Each time the memory is cleared, the sensor is reprogrammed and the monitoring program is restarted. A member of the research team must confirm that the monitoring program has actually restarted prior to departure from the site. When the research team downloads a sensor, a depth-to-water measurement is also taken with an electric tape (Model 101, Solinst Canada Ltd.). The same electric tape was used for all the depth-to-water measurements taken in this reporting period.

The weather station is also downloaded each time the research team visits the site. The downloading is done using a standard laptop computer. Dave Arnold also helps download the weather station during the winter. As described in the previous section, a radio modem has been attached to the weather station (not shown in Figure 12) and an accompanying base station has been set up in Dave Arnold's home to allow the weather station to be downloaded at a preset interval and the data sent via email to the KGS. The final steps in that procedure were being worked out at the close of this reporting period.

Task 6 – Processing and analysis of pressure-sensor and weather-station data

Pressure-sensor data

After downloading, the pressure-sensor data are forwarded to Dr. Xiaoyong Zhan at the KGS for processing. Dr. Zhan removes the atmospheric-pressure component from the pressure sensors submerged in the water column and adds the new data to the existing master file. The data are currently stored in Excel worksheets, but efforts have begun towards moving the data into an Oracle database. That work, however, was not completed prior to the end of this reporting period.

As of the completion of this report, all pressure-sensor data had been processed through the June 16, 2005, download. Because the salt-cedar control measures have yet to be fully implemented, this report does not include an in-depth analysis of the collected data. That analysis

will be provided in a subsequent project report. Data from well Ash12 will be presented here to illustrate the temporal pattern of water-table variations observed at the site and to discuss two problems faced in this first reporting period.

Figures 13 and 14a-b are plots of depth to water recorded at well Ash12 for the entire reporting period, the first 60 days, and the last 60 days, respectively. The water table at well Ash12 varied over a 2.6-ft interval during the reporting period. At the start of the period in late August of 2004, plant-induced fluctuations in the water table were clearly observed (Figures 13 and 14a), as they were at well Ash22 (Figure 3a) and all other wells except well Ash32 (Figure 3b). These fluctuations die-out by mid-October as the salt cedar transition into dormancy and only reappear in May of 2005. Figures 13 and 14b illustrate the two problems that were encountered during the monitoring period. These problems, barometer submergence and incorrect temperature compensation of barometer measurements, are described in the following paragraphs.

Barometer submergence – The barometers were originally placed about 5 ft below the top of casing at wells Ash12 (3.35 ft below land surface) and Ash32. Unfortunately, the water table rose more than we anticipated. At 18:45 on 11/16/04, it rose above the sensing port for the barometer (sensor 16977) in well Ash12. The submergence of that barometer is easily recognized after processing the sensor in the water column at Ash12 (sensor 15936) because all pressure changes after submergence are the same for the original sensor in the water column and the now-submerged barometer. This situation creates a horizontal line on the water-level plot for well Ash12 (Figure 13). Note that the same problem occurred at well Ash32 on 19:30 on 10/13/04 but was not recognized due to the back-up status of that barometer. Because of a delay in processing the data downloaded on December 2, we did not recognize the problem until early January 2005. A KGS staff member went to the site and raised the barometers in both wells into the surface casing (barometers in both wells raised until sensing port was 0.08 ft above lsf) on 1/13/05. This was a foot higher than had been requested and led to a new problem discussed below. Although the submergence problem is now solved, there is no way of correcting the data between 11/16/04 and 1/13/05. Fortunately, the missing water-level data are of little importance to this project because there was essentially no transpiration during this period. Barometer submergence is now checked during each site visit and an additional back-up barometer has been added to the weather station.

Incorrect temperature compensation of barometer measurements - The repositioning of the barometers into the surface casing resulted in a new problem. As soon as the barometers were moved up, we saw additional noise in the data (Figures 13, 14b, and 15). We attributed that noise to incorrect temperature compensation of the barometric-pressure measurement. A temperature sensor inside the barometer body provides the reading used for the temperature compensation of the pressure measurement. We attribute the noise to the time required for that temperature sensor to equilibrate with the air temperature in the casing. Prior to equilibration, the barometric-pressure measurement is not thermally compensated in the appropriate manner, producing noise in the data record. The noise characteristically is observed as an abrupt upward spike coinciding with the onset of solar heating in the morning. The spike gradually decays during the day and virtually always disappears before midnight. This problem was resolved on May 25, 2005, when Dave Arnold, at our request, lowered the barometer in well Ash12 until its sensing port was at a position 1.59 ft below land surface. The temperature-induced fluctuations abruptly ceased at that time as shown by the pressure-sensor data from

well Ash32 (Figure 15). On June 2, 2005, we moved the back-up barometer in well Ash32 to a sensing-port position of 1.56 ft below lsf. We are currently working on procedures to remove the noise produced by incorrect temperature compensation from the data. Our current procedure exploits the fact that water levels at Ash32 are not subject to the variations induced by plant-water use as at the other wells and therefore display a very smooth variation through time (Figures 3b and 15).

Weather-station data

After downloading, the weather-station data are forwarded to Dr. Zhan for processing. Dr. Zhan adds the new data to the existing master file and calculates the reference evapotranspiration parameter (ET_0 – Allen et al. [1998]) based on the Penman-Monteith equation [Campbell and Norman, 1998] to characterize the potential for evapotranspiration when water is not a limiting factor. The data are currently stored in Excel worksheets, but efforts have begun to move the data into an Oracle database that will be accessible on the Internet. That work, however, was not completed prior to the end of this reporting period.

Figure 16 displays the reference evapotranspiration parameter for the entire period during which the weather station was operating. The decrease in ET_0 in the winter months and the increase in the spring are as expected. The sizable temporal variations in ET_0 observed throughout the period also are as expected and are a product of changing meteorological conditions.

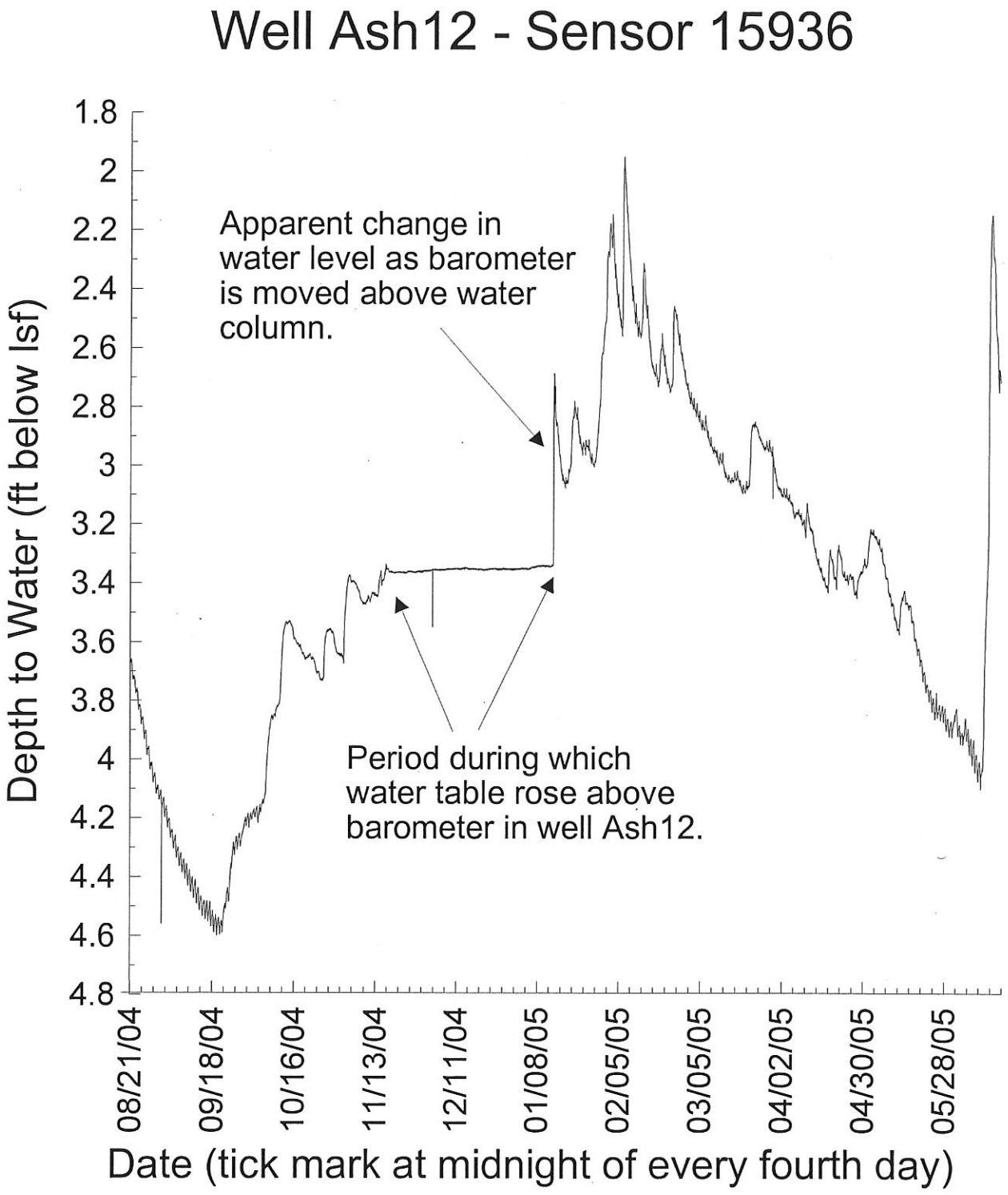
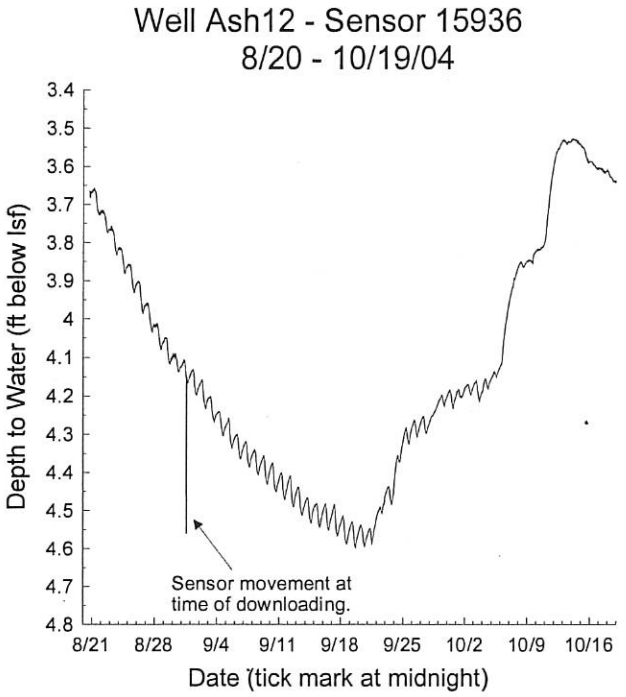


Figure 13 - Depth to water from land surface recorded in well Ash12 for the entire reporting period (well Ash12 in unaltered area [Plot 1], Figure 6a is a photograph of well and surrounding vegetation). Note high-frequency noise during winter months caused by incorrect temperature compensation of barometer readings.

a



b

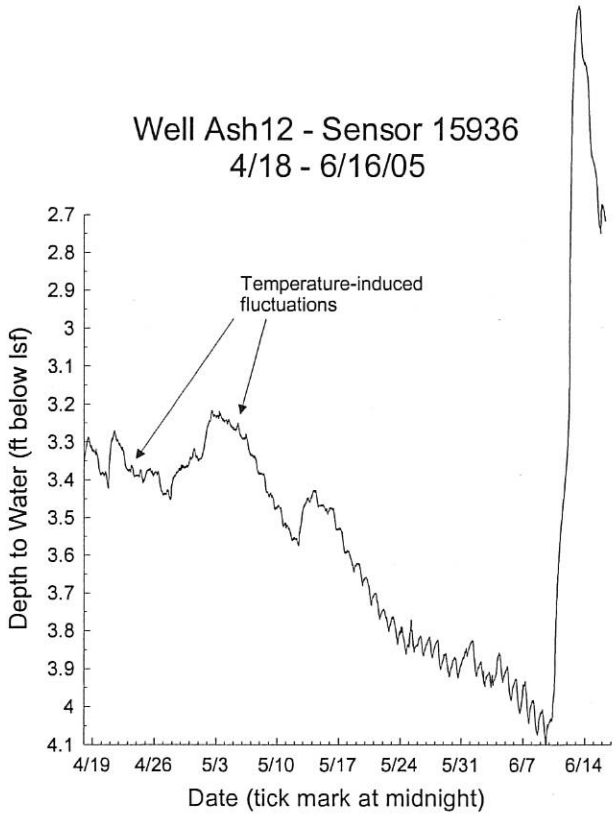


Figure 14 - Depth to water recorded in well Ash12 for the first (a) and final (b) 60 days of the reporting period (downward spikes in water-level data [a] are commonly observed at the time of downloading because the sensor is often moved up slightly to facilitate attachment of download cable; note vertical extent of y-axis in both plots is same as in Figure 3a-b).

25

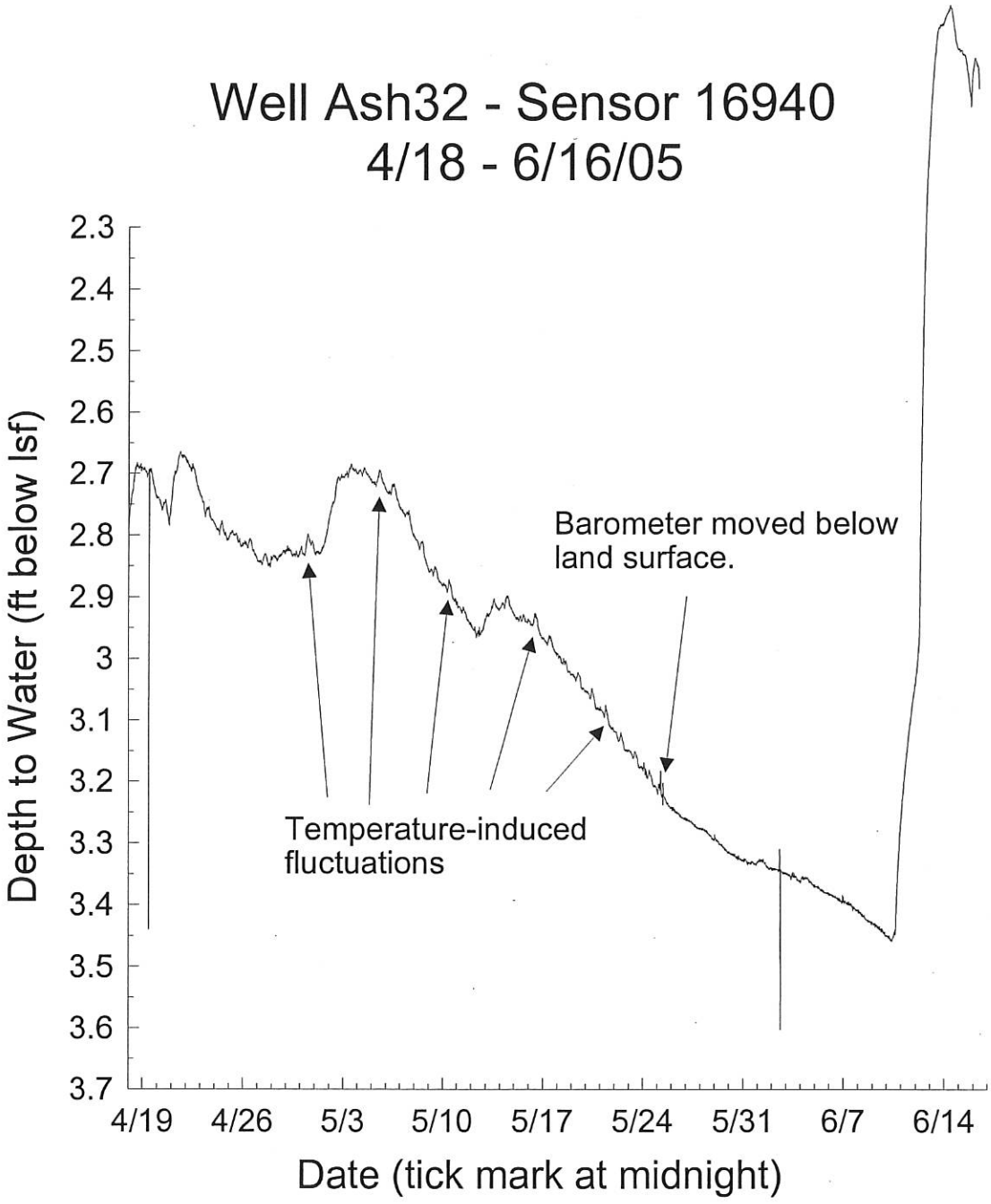


Figure 15 - Depth to water recorded in well Ash32 for the final 60 days of the reporting period (note downward spikes in water-level data at time of downloading as in Figure 14a; barometer [sensor 16977] moved 1.59 ft below lsf on May 25, 2005).

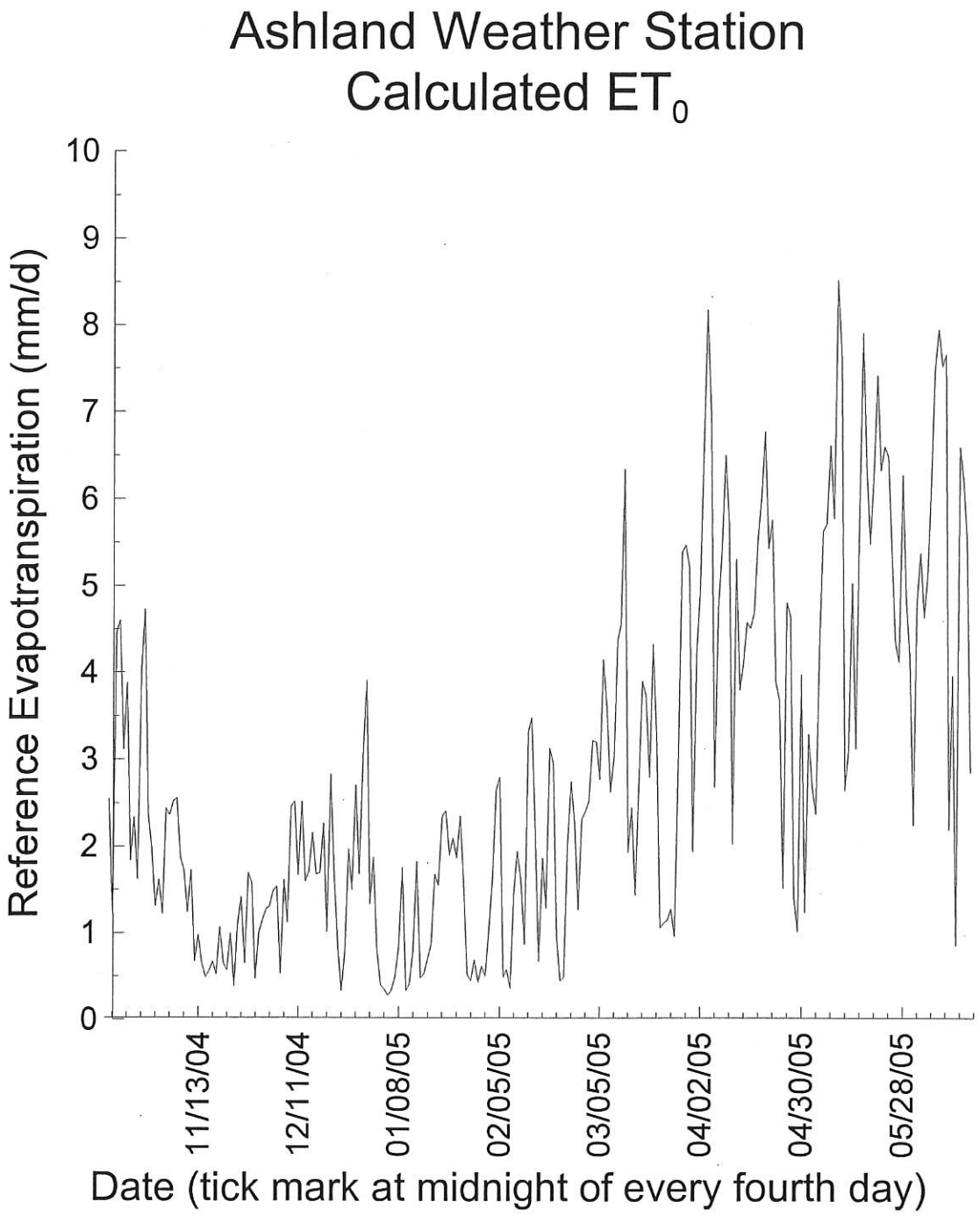


Figure 16 – Calculated reference ET_0 for entire duration of weather station operation during this reporting period.

Task 7 – Neutron logging

Measurements of moisture content in the access tubes adjacent to each well were recorded with a neutron probe (Model 503 DR Hydroprobe Moisture Depth Gauge; Campbell Pacific Nuclear) using a count duration of 16 s and depth increments of 0.5 ft. Standard counts were recorded in the field both prior to and after access tube measurements. Note that this contract provided support for installation of the neutron-probe access tubes but not for travel to the Ashland site to perform the logging. Thus, only one set of logs (obtained on August 20, 2004 at the time of installation) was obtained in the August 2004 to April 2005 period. After that time, the research team obtained funding from the Kansas Water Resources Institute to support travel to the site to perform the neutron logging.

Task 8 – Processing of neutron logs

The neutron logging data were processed at KSU. The mean standard count for the duration of the study was used to convert each measured count to a count ratio (CR). The soil volumetric water content ($m^3\ m^{-3}$), θ, corresponding to each measured count ratio was calculated with the calibration equation $\theta = 0.2929 \times CR - 0.0117$, which was based on laboratory calibrations and an adjustment for PVC pipe. However, the calculated moisture content values are subject to revision because of the sensitivity of the neutron probe results to soil salinity. As shown by the direct-push EC logs presented earlier, the Ashland soils have very high EC readings, which may affect the results of the neutron logging.

Figures 17a-b display results of neutron logging at access tubes adjacent to wells Ash12 and Ash22, respectively. The large differences between the moisture content profiles from the Ash12 access tube, particularly in the first foot, are undoubtedly due to the existence of coarse (i.e. rapidly drained) material near the surface (see low EC values near surface in log of Figure 6b). The small differences observed between the moisture content profiles from the Ash22 access tube are consistent with the high EC values (suspected clayey soil zone) observed near the surface at that well (see Figure 8b). These readings may be influenced by salinity as indicated in the previous paragraph. However, the total porosity values below the water table appear reasonable for both access tubes.

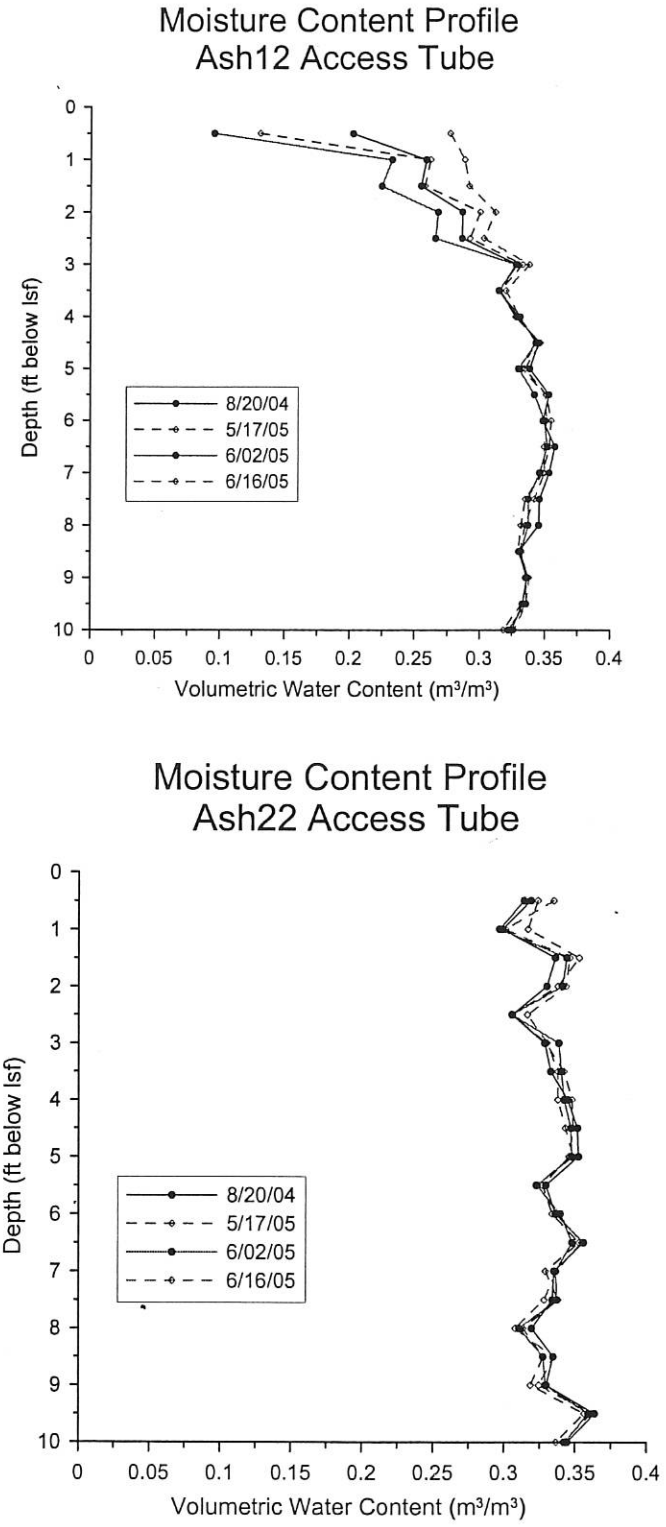


Figure 17 – Volumetric water content versus depth plot from neutron-probe access tube adjacent to well Ash12 (a) and well Ash22 (b).

REFERENCES (work cited in text, project presentations (*), or general references (**))

Allen, R.G., L.S. Pereira, D. Raes, and M. Smith. 1998. Crop evapotranspiration – Guidelines for computing crop water requirements. *FAO Irrigation and Drainage Paper 56*, Food and Agricultural Organization of the United Nations, Rome.

Butler, J.J., Jr., J.M. Healey, L. Zheng, W. McCall, and M.K. Schulmeister. 1999. Hydrostratigraphic characterization of unconsolidated alluvial deposits with direct-push sensor technology. *Kansas Geological Survey Open-File Report 99-40*, 30 pp.

*Butler, J.J., Jr., G.J. Kluitenberg, D.O. Whittemore, J.M. Healey, and X. Zhan. 2005. Quantifying ground-water savings achieved by salt-cedar control measures: A demonstration project. *Eos* 86(18), Jt. Assem. Suppl., Abstract H33B-06 (poster presented at a special session entitled "Measurement and Monitoring Methods in Ecohydrology" at the Spring Meeting of the American Geophysical Union, New Orleans, May 25, 2005).

*Butler, J.J., Jr., G.J. Kluitenberg, and D.O. Whittemore. 2004. Assessment of changes in ground water availability associated with a salt cedar control project in Clark County (presentation at a salt-cedar control workshop hosted by the Kansas Alliance for Wetlands and Streams and the Kansas Grazing Lands Coalition, Ashland, October 6, 2004).

Butler, J.J., Jr., G.J. Kluitenberg, D.O. Whittemore, S.P. Loheide, II, W. Jin, M. Billinger, and X. Zhan. A field investigation of phreatophyte-induced fluctuations in the water table, manuscript under review by coauthors.

Campbell, G.S., and J.M. Norman. 1998. *An Introduction to Environmental Biophysics*. Springer, New York, 286 pp.

**Glenn, E.P., and P.L. Nagler. 2005. Comparative ecophysiology of *Tamarix ramosissima* and native trees in western U.S. riparian zones. *Jour. of Arid Environments*, in press.

**Shafroth, P.B., J.R. Cleverly, T.L. Dudley, J.P. Taylor, C. Van Riper, III, E.P. Weeks, and J.N. Stuart. 2005. Control of *Tamarix* in the western United States: Implications for water salvage, wildlife use, and riparian restoration. *Environmental Management* 35(3), 231-246.

Schulmeister, M.K., J.J. Butler, Jr., J.M. Healey, L. Zheng, D.A. Wysocki, and G.W. McCall. 2003. Direct-push electrical conductivity logging for high-resolution hydrostratigraphic characterization. *Ground Water Monit. and Remed.* 23(3), 52-62.

LEGISLATIVE HEARING ON CHRONIC WASTING DISEASE February 9, 2006

Chronic wasting disease (CWD) is a fatal disease of white-tailed deer, mule deer, elk, and moose, all members of the Cervidae family of mammals. CWD is classified as a transmissible spongiform encephalopathy (TSE). TSEs are diseases caused by abnormal forms of a protein called a prion. This series of neurological diseases are characterized by the microscopic changes seen in the brain tissue of infected animals. A spongy appearance is detected where brain cells have died. The diseases generally occur late in the animal's life, having a long incubation period. The diseases frequently follow a long course of progressive debilitation to death. There are no treatments and no preventative vaccines.

Symptoms of CWD in deer and elk include loss of body weight, shabby or poor coat condition with piloerection of hair along the backbone, drooping ears, excessive salivation and urination, unusual behavior including lack of response to people, head tremors, periods of apparent stupor, and lack of coordination. The combination of hyper salivation and inhalation of foreign material into the lungs among animals with CWD occasionally leads to aspiration pneumonia in association with CWD.

TSEs are specific diseases that are generally restricted to a particular species or to a group of related species. They include diseases such as scrapie in sheep and goats, transmissible mink encephalopathy in ranched mink, bovine spongiform encephalopathy (BSE) in cattle, and CWD in white-tailed deer, mule deer, elk and moose.

Human prion diseases include: Creutzfeldt-Jakob Disease (CJD), variant Creutzfeldt-Jakob Disease (vCJD), Gerstmann-Straussler-Scheinker Syndrome, Fatal Familial Insomnia, and Kuru.

An overview of prion caused diseases may be found at:
http://www.cdc.gov/ncidod/dvrd/prions/

TSEs are unique diseases in that the cause of the disease is thought to be a particle that the individual produces. Healthy animals produce prions. The disease causing prions are misfolded versions of those particles. In a disease like CWD the initial disease prions may be acquired as a foreign body picked up from a diseased animal or the environment where that animal lived. The disease progresses as a result of the CWD prions being produced and accumulated in the animal's body after that point. Typically diseases caused by foreign bodies like viruses, bacteria, molds, and protozoa have DNA or RNA, which regulate their reproduction in the host body. Prions lack DNA and RNA and the disease

versions of the prion accumulate in the body because of their ability to cause normal prions to misfold in the different design and these particles are resistant to enzymes in the body that break down the normal prions. The disease causing prions are highly resistant to degradation. That feature of disease prions becomes an important consideration in management within the environment where they occur.

TSEs have been determined to occur as a result of four processes, namely:

1) direct transmission between individuals or between a susceptible individual and an environment where diseased animals have occurred (horizontal transmission)
2) along a specific genetic lineages (vertical transmission)
3) after the ingestion of disease material (contamination), or
4) as a result of a random mutation of the genes that produces prions (sporadic).

The most likely mode of transmission for CWD is horizontal transmission. Apparent transmission has been observed between mule deer and elk, mule deer and white-tailed deer and elk and either species of deer. The human prion diseases known as Gerstmann-Straussler-Scheinker Syndrome, and Fatal Familial Insomnia are examples of TSEs that follow genetic lineages. BSE is generally considered a TSE that increased in prevalence and distribution as a result of contaminated feeds. Classical CJD is a TSE that appears to occur sporadically around the world affecting about one person in a population of a million.

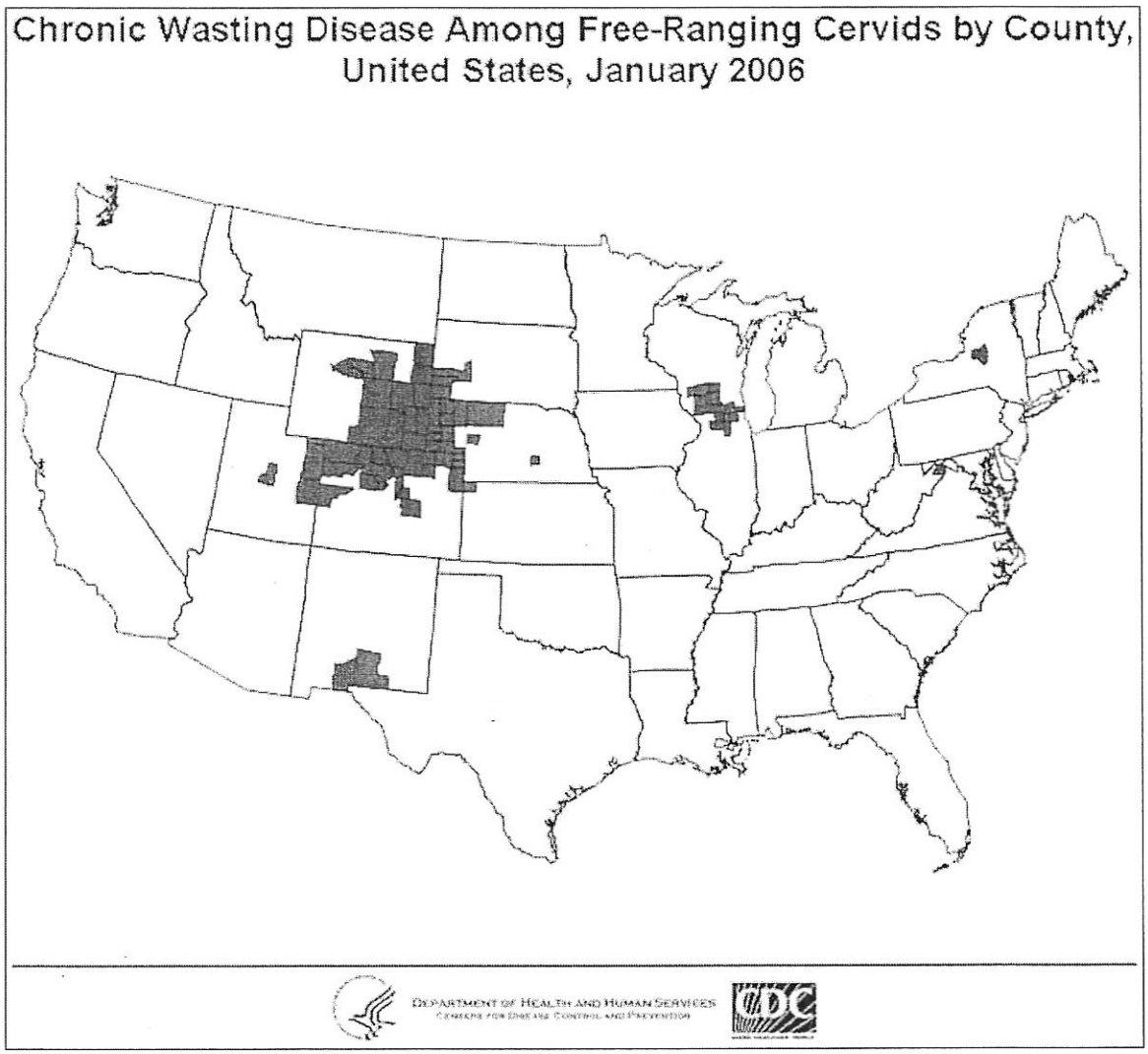
TSEs are not new in Kansas. Both scrapie and CJD have been documented in the state for years. A single case of CWD was documented in 2001 in a captive elk in Kansas that had been purchased and shipped from a captive elk farm in Colorado.

Distribution and Occurrence of CWD:

CWD was first identified as a syndrome in captive mule deer in Colorado in the late 1960s. It was recognized as a spongiform encephalopathy in 1978. The first cases of CWD identified in wild cervid populations occurred in 1981, 1985, and 1990 in elk, mule deer, and white-tailed deer, respectively.

By the mid-1990s, CWD had been diagnosed among free-ranging deer and elk in a contiguous area in northeastern Colorado and southeastern Wyoming, where the disease is established. In recent years, CWD has been found in areas outside that zone, including areas east of the Mississippi River in Illinois, New York, West Virginia, and Wisconsin. The geographic range of diseased animals currently includes 11 U.S. states and two Canadian provinces and is likely to continue to grow. Surveillance studies of hunter-harvested animals indicate the overall prevalence of the disease in northeastern Colorado and southeastern

Wyoming from 1996 to 1999 was estimated to be approximately 5% in mule deer, 2% in white-tailed deer, and <1% in elk.



Deer and Deer Hunting Issues:

There are no biological or ecological barriers to the natural spread of CWD throughout the range of deer, or elk. Unlike scrapie in sheep, no genetic variation in white-tailed deer or mule deer has been identified in these species that might provide some degree of protection for a segment of the population.

CWD is not a disease that spreads rapidly though a population. It is also not a disease that causes large numbers of animals to be sick or dying at one time. It is a disease with a slow progressive spread across the landscape and with a gradual increase in prevalence over years. As with other diseases that manifest

themselves late in the lives of animals, have long latency periods and progress slowly once they become clinical, CWD is expected to have mild effects on population dynamics of the species. We should not anticipate that CWD will reduce deer densities. It will however, shift the age structure of the population to a younger population and it will reduce the esthetic characteristics of the populations. Those changes may have economic and social implications for Kansas landowners, especially those attempting to benefit from leasing land to deer hunters.

CWD has occurred in parts of Colorado and Wyoming for 20 years. The presence of the disease has not caused deer hunters to abandon their traditional hunting locations.

Wildlife management techniques to eradicate this disease in free ranging populations are not available. It is generally assumed that deer population densities are directly related to the speed and completeness of the spread of the disease. For example, in a sparse population there may be areas where the disease does not establish and the spread of the disease is assumed to be slower. Practices that concentrate deer, such as artificial feeding are assumed to increase the speed that the disease can travel through the population.

Wildlife management practices incorporated in some areas where CWD has established include:

1) programs that encourage hunters to reduce the deer density
2) restrictions on the movement of deer carcasses
3) programs that address the potential for shipment of captive deer and elk that might have CWD
4) programs to make CWD testing more readily available to hunters (including programs where local veterinarians or people other than wildlife agency personnel collect samples and send them to diagnostic labs)
5) programs where wildlife agency personnel or contractors reduce local populations of deer in hotspots for CWD prevalence using techniques not available to hunters and outside the normal hunting seasons.

The Colorado Division of Wildlife and the National Park Service have experimented with the capture and testing of deer in areas where hunting is not allowed. Veterinarians have taken tissue biopsies from those animals for CWD testing. They then returned to the site and removed individual animals that tested positive for the disease but left the rest of the animals. Such intensive programs are extremely expensive and have not proven to be effective in the control of the disease.

Human Health Issues:

There is no confirmed evidence of a link between CWD and any disease or illness in humans. A link to the Center for Disease Control and a recent reference on this subject is:
http://www.cdc.gov/ncidod/EID/vol10no6/03-1082.htm

The authors have investigated the public health records and have been unable to find a connection between CWD and human illness. The main conclusion of their study was that the potential for CWD transmission to humans is low, if any risk occurs. There have been no known human cases of CWD and no known human prion diseases associated with CWD.

Within recent weeks there have been articles in newspapers around the nation about a recent study that reports findings of CWD prions in deer muscle tissue. Some of those articles suggest that this creates a new or higher threat to humans than was previously considered. The findings in this recent study are neither unexpected nor do they change the status of human safety. The newspaper accounts are of a study conducted by Rachel C. Angers and others and published in Science. That study reported using a bioassay to detect prions at a much lower level than previous testing had permitted. Scientists will be able to detect prions at even lower densities as better diagnostics are developed. Both lymphatic and nerve tissues are found in muscle and elsewhere in the body. Most scientists believe that prion transmission involves lymphatic and or neuronal transport and therefore should be anticipated in muscle but at a lower level than occurs in the brain or lymph nodes. The risk to humans has not changed. Risk has been assessed on the basis of no known link between CWD and unusual cases of CJD. The risk has not been established based on humans being able to avoid consumption of CWD prions by consuming only certain portions of a deer or elk.

The KDWP recommendation for people that consume venison from areas where CWD is present is to avoid deer or elk that appear to be sick, and not eat venison from animals that have tested positive for CWD. Other suggestions include:

- Wash hands, work surfaces, and tools thoroughly before and after processing game meat. Wear latex or rubber gloves whenever possible.
- Do not allow gut material or waste to contaminate meat.
- Remove the meat from the bones and spinal column.
- Never include the brain, eyes, spinal cord, spleen, digestive tract or lymph nodes with meat. (Note: normal field dressing that removes internal organs and processing that removes fat and connective tissue from the meat, will remove most lymph nodes.)
- Process each deer or elk separately. Mark each package with your permit number.

- Use separate knives and tools while processing your venison; regular household knives are not recommended. Disinfect these tools prior to using them for other tasks if you used them to cut off antlers, cut through bones, or sever the spinal cord.
- A 50/50 solution of household chlorine bleach and water may be used on tools and work surfaces. Soak saws and knives in solution; wash and rinse tools and work surfaces.

The issue of human safety from the consumption of venison is best addressed by a person's physician and by the Kansas Department of Health and Environment.

Livestock Health Issues:

There is no confirmed evidence of a link between CWD and any disease or illness in livestock. Belay et al. (2004) provided the following account on CWD as a livestock health issue:

> "Although CWD does not appear to occur naturally outside the cervid family, it has been transmitted experimentally by intracerebral injection to a number of animals, including laboratory mice, ferrets, mink, squirrel monkeys, and goats (1,26). In an experimental study, the CWD agent was transmitted to 3 of 13 intracerebrally injected cattle after an incubation period of 22 to 27 months (27). The susceptibility of cattle intracerebrally challenged with the agent of this disease was substantially less than that observed after intracerebral scrapie challenge: nine of nine cattle succumbed to scrapie challenge after intracerebral injection (28). In ongoing experimental studies, after >6 years of observation, no prion disease has developed in 11 cattle orally challenged with the CWD agent or 24 cattle living with infected deer herds (E.S. Williams and M.W. Miller, unpub. data) (1). In addition, domestic cattle, sheep, and goat residing in research facilities in close contact with infected cervids did not develop a prion disease.
>
> Analysis by immunohistochemical studies of the tissue distribution of prions in CWD-infected cervids identified the agent in the brain, spinal cord, eyes, peripheral nerves, and lymphoreticular tissues (Table 1) (29,30). Distribution of the CWD agent outside of the brain seems to be less widespread in elk than in deer (2). Involvement of the tonsils and peripheral nerves early in the course of experimental and natural prion infection suggests the possible involvement of the lymphoreticular and peripheral nervous systems in the pathogenesis and transmission of the disease (2,12,30,31)."

Kansas CWD Contingency Plan and the Future:

Kansas has been an active participant in CWD planning at the state, regional, and national level. Kansas was the co-host and coordinator for the first CWD Symposium. KDWP had a representative on the committee that prepared a plan titled, MULTI-STATE POLICY FOR CHRONIC WASTING DISEASE MANAGEMENT IN FREE-RANGING DEER AND ELK. That plan was signed by the heads of 26 state wildlife agencies. It listed its objectives as:

(1) Minimize the potential for CWD to spread beyond current affected areas.
(2) Manage infection rates (prevalence) within existing affected areas using results and techniques provided by ongoing and future research according to objectives set by each state. Based on current understanding of CWD in free-ranging deer and elk, eradication of CWD may not be a justified or realistic management objective within endemic areas.
(3) Determine the status and extent of CWD when the disease is discovered in a previously unknown location and, if determined to be feasible, attempt to eliminate the disease.
(4) Support and conduct, on a priority basis, applied research that will facilitate continued expansion of knowledge of CWD.
(5) Provide timely, complete and accurate information about all facets of CWD to personnel of participating agencies and the public of involved states and throughout the United States.

KDWP had a representative on a committee of the International Association of Fish and Wildlife Agencies that addressed, "Transport and Disposal of Potential Chronic Wasting Disease (CWD) Hunter-killed Carcasses: Recommendations to Wildlife Agency Directors."

Management and movement of captive deer and elk must be part of any comprehensive disease management strategy for CWD in free ranging populations. KDWP stands ready to assist the Kansas Animal Health Department in the monitoring of captive facilities.

The Kansas Department Wildlife and Parks completed a contingency plan in March 2003 to address CWD in Kansas. The plan outlines events that will occur during the first four weeks after the initial discovery of CWD in free ranging deer or elk in Kansas. That plan was activated on January 23, 2006. The plan calls for a localized collection of additional samples from deer in the vicinity of the index case. A public meeting was held at St Francis, Kansas on February 2, 2006 to inform local residents that the department planned to collect additional deer in Cheyenne County. That collection will take place during the week of Feb. 13 – 17, 2006.

Deer management plans and regulations will be evaluated relative to their effect on CWD during the annual regulation review process for 2006. Activities under consideration shall include:

1. Level of hunting pressure on deer and elk populations,
2. Harvest that shifts the age structure and / or sex ratios of herds,
3. Hunter restrictions on the transport of carcasses,
4. Hunter requirements for disposal of carcasses,
5. Prohibitions or restrictions on feeding and baiting.

CWD has been documented in free ranging deer and elk populations since the 1980s and has possibly occurred much longer than that. Various state wildlife agencies have attempted to control the spread and prevalence of CWD. Unfortunately, no set of management options has been recognized as effective. For that reason most wildlife agencies have selected adaptive approaches to CWD management. As the Multi-State Plan states:

> "The represented states are committed to reducing the impact of this disease on free-ranging and captive deer and elk populations within their jurisdictions. States will use the best scientific information available and take all reasonable and necessary steps, consistent with these guidelines, to achieve these five objectives. Further, representatives will meet periodically on the status of the disease and management efforts in their respective states. Representatives will also periodically review these guidelines and associated objectives to provide additional guidance as needed or as dictated by new information."

House Environment Committee
February 9, 2006
Attachment 4

Encroachment Management Through Use of Army Compatible Use Buffers (ACUBs)

Mr. Jeff Keating

Directorate of Public Works

House Environment Committee
February 9, 2006
Attachment 4-1

KEY ISSUES

- Encroachment Concerns
- ACUB Solution
- Fort Riley ACUB Status

Jeff Keating, IMNW, jeff.keating@riley.army.mil, (785) 239-8022

Fort Riley Encroachment

4-3

Urban development is encroaching upon Fort Riley

- Manhattan's westward expansion
  - Anderson Avenue corridor
  - Colbert Hills Golf Course
- Riley's westward expansion
- Country homes on western, southern boundaries

Fort Riley's IGPBS/BRAC/Modularity gains will accelerate residential development

- Fort Riley Military Population projected to increase over 25,000
- Local estimates project additional civilian increases of up to 8,000
- Regional housing shortage, over 5,900 units short by 2008

Concern – Increasing pressures restrict training due to

- Mission-related complaints (noise, smoke, dust, etc.)
- Rare habitat losses

Jeff Keating, IMNW, jeff.keating@riley.army.mil, (785) 239-8022

Encroachment Noise Issues

4-4

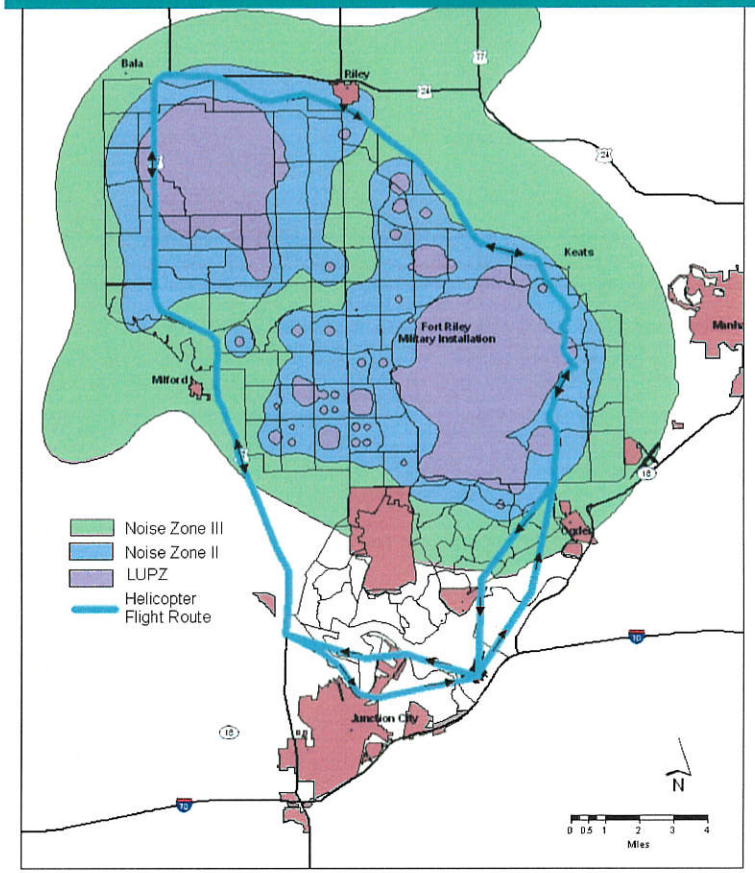
Noise Zones reflect annualized noises

- **Zone II** – Significant noise, limit use to non-sensitive activities (industrial, agriculture)
  - Encroachment may impact firing capabilities at the tank gunnery ranges
  - Encroachment may impact road demolition training at Range 52

- **LUPZ (Land Use Planning Zone)** - During active training, irritation level is as high as in Noise Zone II
  - Ranchettes west and south of Fort Riley will likely impact helicopter flight operations beyond the installation's boundary

Helicopter traffic will increase

Off-post Impacts:
Noise Zone II covers 3,800 acres
LUPZ covers ~ 46,000 acres

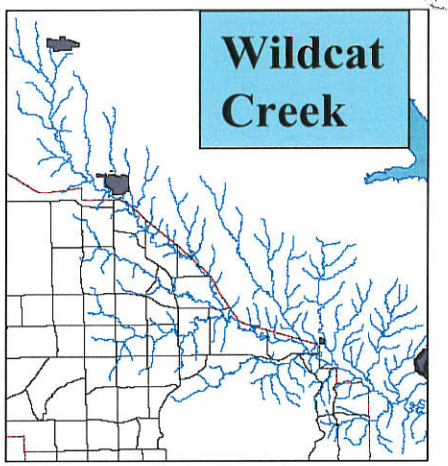


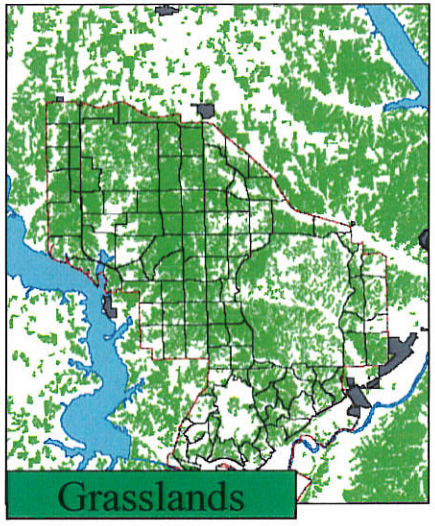
Jeff Keating, IMNW, jeff.keating@riley.army.mil, (785) 239-8022

Encroachment Conservation Issues

- **Topeka Shiner** (endangered species)
  - Wildcat Creek off-post drainage > 50% of habitat
  - Possible training restrictions if development reduces Topeka shiner numbers in Wildcat Creek

- **Regal Fritillary Butterfly** (Species of Concern)
  Henslow's Sparrow (Species of Concern)
  Greater Prairie-Chicken (Blue List Species)
  - Require extensive tallgrass prairie landscapes
  - Fort Riley has major breeding populations
  - Development is removing prairie parcels north and west of Fort Riley
  - Potential training restrictions, if species are listed:
    - Due to FIRE
      - Restrict firing at ranges April 15-August 15
      - Restrict incendiary devices April 15-August 15
    - Due to running over nests or individuals
      - Restrict cross-country vehicle movements in breeding habitat

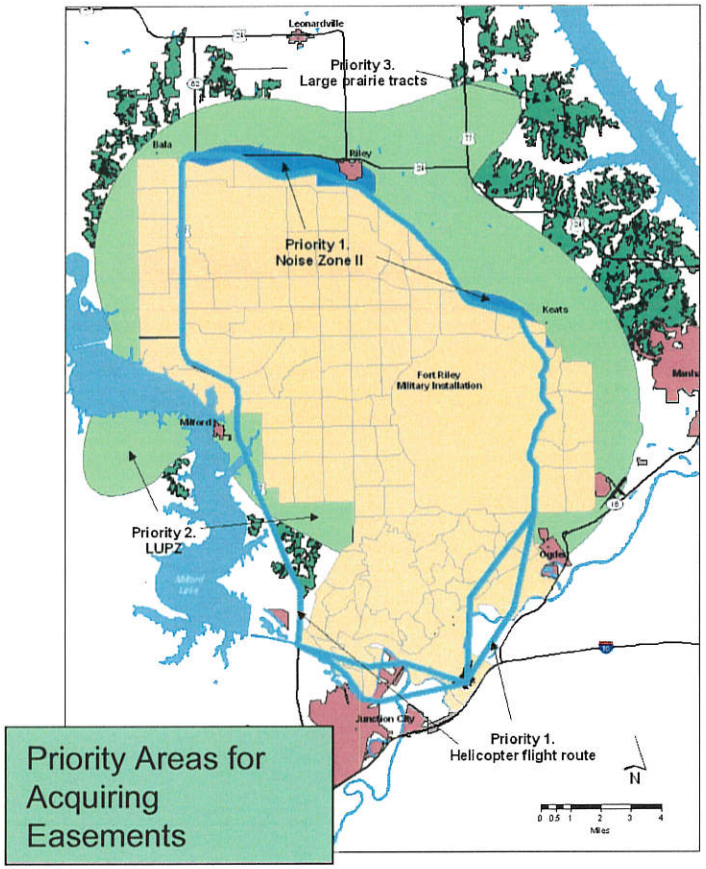




Jeff Keating, IMNW, jeff.keating@riley.army.mil, (785) 239-8022

ACUB SOLUTION

Buffer Areas Around Fort Riley



Priority Areas for Acquiring Easements

- Partnership between Fort Riley and the Kansas Land Trust (KLT)
- KLT approaches landowners and performs real estate transactions
- Willing landowners only
- Does not create more training land
- Does not put new land into Army inventory
- Maximizes capability of existing lands
- Supports objectives for open space and species habitat conservation

Jeff Keating, IMNW, jeff.keating@riley.army.mil, (785) 239-8022

ACUB SUCCESSES

	FY 2003-2005		
	DoD*	Partner*	Acres
Camp Blanding, FL	$1	$31.5	12,666
Camp Ripley, MN	$0.5	$35	600
Fort Carson, CO	$9.5	$1.5	4,960
Fort Bragg, NC	$2	$1.2	628
Fort Sill, OK	$0	$1	400
Fort Stewart, GA	$3	$0	0
US Army Garrison, HI	$5.4	$3.4	0
Total	$21.4	$73.6	19,254

***All figures represent millions of dollars**

ACUB Program Expenditures

- FY 2003 $0.68M
- FY 2004 $1.3M
- FY 2005 $18.9M
- **FY 2006 $37M**

ACUB Program funded by Congressional Budget line item

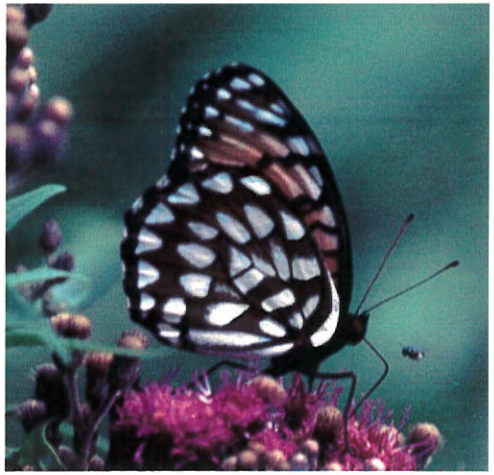
Jeff Keating, IMNW, jeff.keating@riley.army.mil, (785) 239-8022

Fort Riley ACUB Status

- Army's ACUB Site Assistance Team visited 19-20 OCT
  - Informally reviewed Fort Riley's proposal
  - Fort Riley in position to compete for FY06 funding
- ACUB proposal submitted, awaiting HQDA approval
- Probable partners identified (Kansas Land Trust – KLT)
  - ACUB funds are eligible to match with the Farm and Ranch Lands Protection Program, NRCS-USDA
  - ACUB funds eligible to match with State of Kansas appropriations
- Meetings held to deliver government agency and political notifications
- KLT initiated landowner contacts
- 1st public outreach meeting held 27 JAN, more planned

Jeff Keating, IMNW, jeff.keating@riley.army.mil, (785) 239-8022

Species Photos



Regal fritillary

Henslow's sparrow

Greater prairie-chicken

Topeka shiner

Jeff Keating, IMNW, jeff.keating@riley.army.mil, (785) 239-8022

Kansas
Petroleum
Council

Comments Submitted to the House Environmental Committee
On House Concurrent Resolution 5030

February 9, 2005

Thank you, Madam Chairman and members of the committee. I appreciate the opportunity to submit these comments on HCR 5030, a concurrent resolution urging Congress and the President to allow offshore drilling for natural gas.

Madam Chairman, you asked me to talk about environmental protection measures connected with offshore oil and gas drilling. I believe in the adage that a picture says a thousand words, and I refer the committee to the map that shows the tracks of Hurricanes Katrina and Rita. As you can see, both hurricanes had the heart of Gulf oil and gas production directly in their cross-hairs.

The Minerals Management Service, an agency of the U.S. Department of the Interior, manages offshore oil and gas exploration. You have a copy of the MMS Hurricane Impact Statement before you dated January 19, 2006. It has much to say, but I would point out that the MMS estimated that 3,050 of the Gulf's 4,000 platforms and 22,000 of the Gulf's 33,000 miles of pipelines were in the direct path of either hurricane.

The storms destroyed 115 platforms in what the MMS termed the "greatest natural disaster to oil and gas development in the history of the Gulf of Mexico."

In the report's third paragraph is an important sentence: *"However, there was no loss of life or significant oil spills from wells on the outer continental shelf (OCS) attributed to either storm."*

Advanced technology, a focus on equipment integrity, and cooperation between the industry and government at the federal and state level created this impressive, positive result in the wake –and I mean that literally – of devastating storms of the century.

The public, unfortunately, often views the oil and gas industry as a staid business with throwbacks to gushing wells and men in dirty clothes throwing a chain around a drill pipe. Those visions are as outdated as the covered wagon.

Searching for oil and natural gas today is a high-tech proposition involving teams of geologists, geophysicists and petroleum engineers. Advanced techniques in the industry employ super-computers, global-positioning technology and remotely operated robots. New drilling technologies means more oil and gas is produced from fewer wells.

Some examples

(1) Three-dimensional seismic imaging generates massive amounts of data to produce multidimensional representations of underground or undersea

SUITE 1005 • 800 SW JACKSON STREET • TOPEKA, KANSAS 6661
PHONE: 785.234.0589 • FAX 785.235.6179 • E-MAIL: kansas@api.

dimensional (4D) time-lapse seismic visualization creates a motion picture view of the flow patterns of oil and natural gas underground. The new age explorers can use virtual reality glasses in an auditorium-sized room to analyze formations. Combined with other targeting techniques, seismic mapping has improved success rates for wells by as much as 50 percent or more. Yields from individual wells can double. Higher success and yield rates mean fewer wells need to be drilling, conserving resources and habitats.

(2) Wells are drilled from a ship that uses dynamic-positioning technology. A series of small thrusters, combined with global positioning technology, allows the ship to remain essentially stable despite wind and water currents. To drill a well in 5,000 feet of water using traditional anchoring systems, anchor lines would need to be over 9 miles long and still would not hold the ship in position well enough to drill. Dynamic-positioning establishes safer operations with a reduced potential for environmental harm and damage to seafloor communities.

(3) On the subject of equipment, some blowout preventers are 45 feet high and weight more than 320 tons. They are installed on the ocean floor to protect the environment from the threat of an accidental deep water oil release. Remotely operated robots work effectively in the high pressure, dark and cold of the ocean to repair and maintain equipment.

(4) Directional drilling provides greater flexibility in well placement, so a well can be placed in an area where it will have the least possible environmental effect and reach a reservoir that might be miles away.

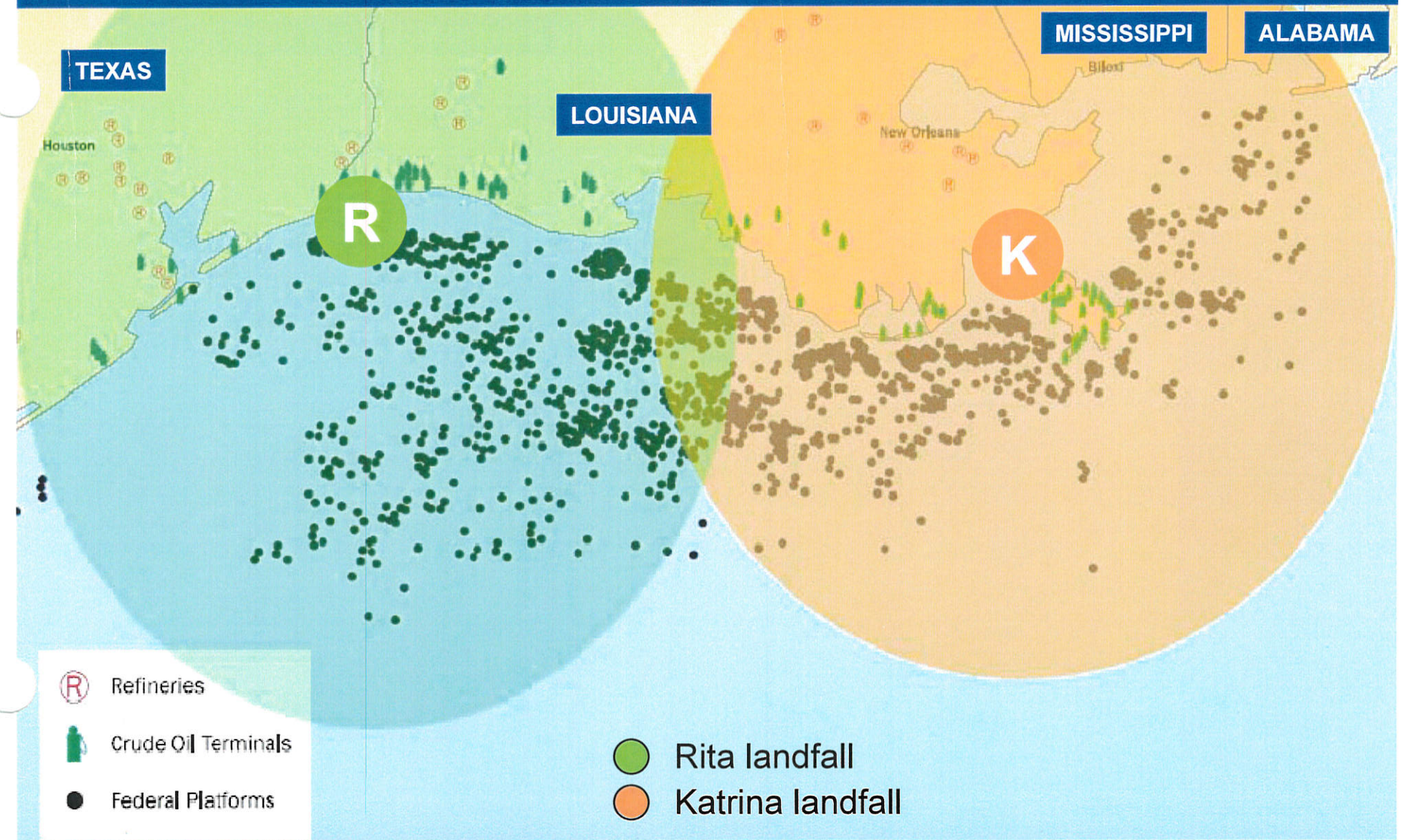
This is an expensive business, and it takes time to develop production. MMS estimates the cost of developing a single deep water field can exceed $1 billion. Costs go higher in deeper water. It also takes time. MMS estimates that three years is required from lease to initial drilling. Seven years is the average from first acquisition to first production.

Platforms in the Gulf of Mexico account for one-fourth of the oil and almost one-third of the natural gas produced in the United States. Yesterday, MMS raised its estimates of oil and gas in US coastal waters by 15 percent – a potential undiscovered 85.9 billion barrels of oil and 414.9 trillion cubic feet of natural gas.

I would like to suggest that the Resolution be broadened to include oil and not just natural gas. Limiting the language to gas is a great disincentive to the industry, and assumes that it has a greater ability to predict what resources will be found than current expertise and technology support.

Thank you.

Hurricanes Rita, Katrina And Gulf Oil & Natural Gas Operations



Sources: NOAA, EIA

Society of Petroleum Engineers

What is the Role of Technology in Oil and Natural Gas Production?

When many people think of the oil and natural gas industry, they think of an old, dirty, staid industry using technology from decades ago. The images they see on television or in the movies show oil gushing madly out of wellbore or a mechanical drilling rig with three men in dirty clothes throwing a chain around drill pipe. Most people do not realize how out-dated these images are. Oil and gas is a very technology-oriented industry; many techniques developed by the industry are now used in other industries, including the space program. Technological innovations have made it possible for the oil and gas industry to supply the fuels that power the world economy.

The development and application of advanced technology is vital to the modern industry task of finding and developing oil and gas resources. The reservoirs are covered with thousands of feet of rock that makes it difficult to "see" the deposits. But the development of three-dimensional (3D) seismic, coupled with significant increases in computational power allow the industry to develop fairly accurate models of the subsurface. While these models can be viewed on a desktop computer, others are viewed in huge theaters with curved screens that can be used to project images in three dimensions. These 3D visualization centers allow technical personnel to see into the subsurface and explore what is there. 3D seismic has enabled the industry to improve its success rate, meaning that reserves are found with fewer wells, less waste, and less surface disturbance.

New and better technology has made it possible for the industry to economically develop large oil and gas deposits offshore. Drilling oil and gas wells in thousands of feet of water adds significantly to the complexity, cost, and potential risks. However, technological innovations have enabled the industry to overcome the added challenges. Wells are routinely drilled in 5,000 feet (1,525 m) of water, and in 2003, a well was drilled in the Gulf of Mexico in nearly 10,011 feet (3,050 m) of water.[1] After penetrating the sea floor, these wellbores extend thousands of feet below the ocean floor.

Such wells are drilled from a ship that uses dynamic-positioning technology. A series of small thrusters, combined with global positioning system (GPS) technology, allow the drillship to remain essentially stable despite wind and water currents — shifting less than 50 feet (15.25 m) in any direction. This stability allows the ship to drill in very deep water and in most weather conditions.

Offshore platforms are very expensive to build and install. The technology that goes into designing these structures, building them in a shipyard, and then transporting and installing them is significant. But if every offshore field required a platform, many offshore resources would be uneconomic to develop, so technology has evolved to place some of the equipment for producing the oil or gas on the seabed. The produced fluids are piped to a nearby platform for processing. These subsea completions are maintained by underwater vehicles called remotely operated vehicles, or ROVs, that are operated by a worker on the platform nearby.

Advanced technology is also important to develop resources in remote and environmentally sensitive locations such as the Arctic. The exploration phase of development (seismic, exploratory drilling) is conducted during the winter months to minimize disturbance to the environment and wildlife. Ice roads and drilling pads are constructed for use in these operations. When spring arrives the ice melts, leaving little or no trace of the operations. If oil or gas is found, technology has made it possible for the operations to have a very small "footprint." Newer Arctic developments use less than 40% of the space that was required to develop Alaska's Prudhoe Bay field. A new type of drilling platform was tested during early 2003 that raises

5-4

drilling activities above the tundra, with only the support legs contacting the surface, further reducing potential impact.

Innovations in technology are expanding the depth horizons for exploration. Subsurface temperatures and pressures increase with depth, so that a depth is eventually reached that is beyond the capabilities of conventional equipment. But industry has worked diligently to develop equipment made from space-age titanium alloys that can withstand the high temperatures and high pressure (HT/HP) in very deep wells. The electronics needed to guide drilling operations and provide feedback on what is encountered downhole have been insulated to withstand HT/HP. As a result of these innovations, the industry now can develop fields with temperatures of 400° F (204° C) and pressures of 16,000 psi (11,000 N/cm^2).

Technology allows the industry to get more oil or gas out of each deposit that it finds. Newer stimulation technologies, treatment fluids and enhanced recovery techniques enable the oil or gas to move more easily to producing wells. Hydraulic fracturing techniques create small cracks from the wellbore into the reservoir rock. These fractures serve as a "highway" for the hydrocarbons to reach producing wells. Horizontal-drilling technologies allow a reservoir to be penetrated horizontally rather than vertically, opening more of the reservoir to the well and enhancing recovery.

Technology has enhanced environmental protection as well. Directional drilling provides greatly increased flexibility in well placement, so that a well can be placed in the area where it will have the least possible environmental effect and still reach a reservoir that might be miles away laterally. Several wells can be drilled from a single location, dramatically decreasing the amount of land surface area required to develop a field. Newer synthetic-based drilling fluids have been developed for applications that previously required oil-based fluids, reducing toxicity, oil usage, and oily wastes that must be disposed. Coiled-tubing drilling units are smaller, use less space, create less visual disturbance, make less noise, use less energy, and reduce waste volumes. When offshore platforms have reached the end of their useful life they may be removed for recycling or appropriate disposal, or they may be relocated for beneficial use as artificial reefs. These artificial reefs expand valuable fish habitats in areas lacking natural reefs (Gulf of Mexico, Thailand, other areas).

Technological innovation has been the hallmark of the petroleum industry from its earliest days. Petroleum engineers and geologists are constantly challenged to learn more about where oil and gas are found, how to get the rocks to give up the hydrocarbons they contain, how to get the oil or gas out of the ground efficiently, and how to do all of it while minimizing environmental impacts. An important part of SPE's mission is to assist the industry in this process through the collection and dissemination of technical information. By learning what others have done successfully, or even tried and failed, engineers are empowered to make the next technological breakthrough that will continue to improve the industry's ability to produce the oil and gas that the world needs.

A presentation (1.94MB), courtesy of the American Petroleum Institute, discusses some of these technical advances and provides illustrations. These slides are based on posters that were displayed in the Russell Senate Office Building rotunda during February 2002.

[1] U.S. Minerals Management Service, "New World Water-Depth Drilling Record Set in Over 10,000 Feet of Water," November 18, 2003.

More on technology advances in the oil and gas industry
Series of short videos on industry technology

- Introduction to Oil and Natural Gas
- Why Do We Need Oil and Natural Gas?
- What is an Oil and Natural Gas Reservoir?
- How Does the Industry Find Oil and Natural Gas?
- How are Oil and Natural Gas Produced?
- Where are Oil and Natural Gas Produced?

5-5

The NewsRoom
Release: #3418
Date: January 19, 2006

Impact Assessment of Offshore Facilities from Hurricanes Katrina and Rita

NEW ORLEANS – The Minerals Management Service today released its analysis of the effects of Hurricanes Katrina and Rita. Analysis of the damage assessment data, along with ongoing research requested by the agency, will be incorporated in plans for future hurricane seasons.

The Gulf of Mexico, one of the nation's largest sources of oil and gas production, was dealt a one-two punch by these hurricanes, causing destruction and substantial damage to offshore platforms within a four-week period in August and September.

MMS estimates that 3,050 of the Gulf's 4,000 platforms and 22,000 of the 33,000 miles of Gulf pipelines were in the direct path of either Hurricane Katrina or Hurricane Rita. Because of the large amount of infrastructure in the path of hurricane-force winds and waves, the amount of damage was substantial. In comparison with Hurricane Ivan in 2004, Hurricanes Katrina and Rita accounted for considerably more damage because of the paths taken by these two devastating storms. However, there was no loss of life or significant oil spills from wells on the outer continental shelf (OCS) attributed to either storm.

Hurricane Katrina, which was a category 5 hurricane when it entered the OCS, destroyed 46 platforms (**Table 1**) and damaged 20 others (**Table 2**). To date, 100 damaged pipelines and 211 minor pollution incidents on the OCS have been reported to MMS. Minor pollution incidents are defined as incidents involving less then 500 barrels of oil that do not reach the coast line. Included in the 100 damaged pipelines in Federal waters were 36 large diameter pipelines (10" or larger) that were damaged (**Table 3**). Twelve of these 36 have returned to service.

Hurricane Rita, which was a category 4 hurricane when it entered the OCS, destroyed 69 platforms (**Table 4**) and damaged 32 others (**Table 5**). To date, 83 damaged pipelines and 207 minor pollution incidents on the OCS have been reported to MMS. Included in the 83 damaged pipelines in Federal waters were 28 large diameter pipelines (10" or larger) that were damaged (**Table 6**). Ten of these 28 have returned to service.

MMS has requested research proposals on six subject areas related to the hurricanes and the damage to offshore oil and gas facilities. The six areas are the following: (1) Assess and evaluate pipeline movement or damage; (2) Assess and evaluate platform damage; (3) Provide hurricane hindcast data; (4) Evaluate and assess the performance of jack-up rigs; (5) Assess methods to eliminate hydrates in pipelines and risers during startups after a hurricane; and (6) Assess the response of waves and currents throughout the water column in the northern Gulf of Mexico slope and shelf.

"The overall damage caused by Hurricanes Katrina and Rita has shown them to be the greatest natural disasters to oil and gas development in the history of the Gulf of Mexico," MMS Regional Director Chris Oynes said. He noted, "Just last year, in the devastating Hurricane Ivan, there were seven platforms destroyed, compared with the 115 platforms destroyed in Katrina and Rita."

5-6

One hundred percent of Gulf oil production, which is approximately 1.5 million barrels a day, was shut-in during both storms and 94 percent of gas production, which is 10 billion cubic feet of gas a day, was shut-in during Hurricane Katrina. More than 90 percent of the manned platforms and 85 percent of working rigs were evacuated at one time. Daily production of about 396,000 barrels of oil and about 1.8 billion cubic feet of gas remain shut-in. For a long-term projection, approximately 255,000 barrels a day and 400 million cubic feet of gas a day will probably not be restored to production prior the start of the 2006 hurricane season.

Oynes noted that, "Assessments on pipeline and facility damages are still ongoing, and any updates will be reflected in future releases. It is likely that additional damage will be reported as underwater damage assessments are completed. These have been delayed because of overwhelmed support resources, such as diving equipment, support vessels, and remotely operated vehicles."

MMS, an agency of the U.S. Department of the Interior, manages offshore oil and gas exploration as well as renewable and alternative energy sources such as wind, wave, and solar on 1.76 billion acres of the Outer Continental Shelf while protecting the human, marine, and coastal environments. The OCS provides 30 percent of oil and 21 percent of natural gas produced domestically, and sand used for coastal restoration. MMS collects, accounts for, and disburses mineral revenues from Federal and American Indian lands, and contributes to the Land and Water Conservation Fund and other special use funds, with Fiscal Year 2005 disbursements of approximately $9.9 billion and more than $153 billion since 1982.

Relevant Web Sites:
MMS Main Website
Gulf of Mexico Website

Media Contacts:
Debra Winbush (281) 873-1858
Caryl Fagot (281) 873-1859

MMS: Securing Ocean Energy & Economic Value for America
U.S. Department of the Interior

Voice of the Kansas Independent Petroleum Industry

Kansas Independent Oil & Gas Association
800 SW Jackson Street – Suite 1400
Topeka, Kansas 66612-1216
785-232-7772 Fax 785-232-0917
Email: kiogaed@swbell.net

Testimony to House Environment Committee
House Bill 2757 – An Act concerning oil and gas; relating to spill notification.

Edward P. Cross, Executive Vice President
Kansas Independent Oil & Gas Association

February 9, 2006

Good morning Chairman Freeborn and members of the committee. I am Edward Cross, Executive Vice President of the Kansas Independent Oil & Gas Association (KIOGA). KIOGA represents the interests of independent oil and gas producers in Kansas. I am here today to offer a small amendment and express our support for House Bill 2757 (HB 2757).

HB 2757 directs the Kansas Corporation Commission (KCC) to adopt regulations requiring oil and gas operators to timely notify landowners of a spill which is also required to be reported to the KCC. Many oil and gas producing properties across the state have multiple landowners. The landowners often have a representative who manages the property, whether that representative is one of the landowners, tenant farmer, or other representative. The oil and gas industry is supportive of measures to notify the landowners should a spill occur on the landowner's property. However, in some cases, operators may not have knowledge of all the landowners. The worst case scenario would require a title opinion to make certain that all landowners were notified. As a matter of efficiency, we feel that notifying the landowners or the representative of the landowners would fulfill the intent of HB 2757 without causing undue burden on the oil and gas operators. Therefore, we respectfully request consideration of an amendment that requires operators to timely notify landowners or the representative of the landowners. A ballooned copy of the proposed amendment is attached to this testimony for your review.

We are supportive of HB 2757 and hope the committee will favorably accept our proposed amendment and pass HB 2757 as amended. Thank you for your time and consideration. I stand for questions.

Session of 2006

HOUSE BILL No. 2757

By Committee on Environment

1-27

AN ACT concerning oil and gas; relating to spill notification.

Be it enacted by the Legislature of the State of Kansas:

Section 1. The state corporation commission shall adopt rules and regulations requiring operators to timely notify landowners or the representative of the landowners of a spill which is also required to be reported to the commission.

Sec. 2. This act shall take effect and be in force from and after its publication in the statute book.

SWKROA

SOUTHWEST KANSAS ROYALTY OWNERS ASSOCIATION

209 East Sixth Street
Hugoton, Kansas 67951

Telephone: 620-544-4333
Email: erickn@swkroa.com

Testimony before the House Committee on Environment
House Bill 2757
February 9, 2006

Chairperson Freeborn and Members of the Committee:

My name is Erick Nordling, of Hugoton, Kansas. I would like to submit remarks on behalf of the members of SWKROA and on behalf of other Kansas royalty owners in support of House Bill 2757.

It appears that current regulations of the State Corporation Commission for Kansas dealing with oil and gas lease operations only require a spill to be reported to the Commission's field offices. HB 2757 requests the development of regulations to notify a landowner of a reportable spill. This is a good concept. Without notification (unless the landowner reports the spill), the landowner may be the last person to know about a spill.

The term 'landowners' under the bill could be expanded to include 'landowner, other person in possession of the land affected by a spill, or an adjacent landowner affected by a spill.'

These effected parties should be notified of the proposed rule making so they could have input on any proposed regulations.

There are also several questions which are raised by the bill. The State Corporation Commission should be able to address these concerns during the rule making process. This list isn't exhaustive, but does show that several issues will need to be addressed in making any rules for such notification. These concerns include:

1. Who should be notified?
   a. The bill only refers to the landowner, but there may be several owners of the land.
   b. Should each of them be notified?
   c. The rules may need to contemplate that a tenant may be entitled to notice too.
   d. Should adjoining landowners be notified too, especially if the spill may contaminate their water sources, or drain onto their property.
2. How should notification occur?
   a. Is phone or personal contact okay, or do the interested parties need to be notified in writing.
   b. Should notice be provided by certified mail?

House Environment Committee
February 9, 2006
Attachment 7

3. Timing of notification.
   a. How soon should the landowner be notified.
   b. What is the obligation of an operator to maintain a current list of landowners, and if the information on the landowners is not readily available.
4. What penalty provisions will apply for failure to notify such landowners.

We urge your support of this bill with consideration of our comments.

Respectfully submitted,

/s/ Erick E. Nordling

Erick E. Nordling
Executive Secretary, SWKROA

F:\DocsWP\ERICK\SWKROA\LEGIS\2006\HB 2757 spill reporting\ErickTestimony.HB2757.02 09 2006.spill notification.wpd

KANSAS
CORPORATION COMMISSION

KATHLEEN SEBELIUS, GOVERNOR
BRIAN J. MOLINE, CHAIR
ROBERT E. KREHBIEL, COMMISSIONER
MICHAEL C. MOFFET, COMMISSIONER

Comments of M.L. Korphage
Director
Of the
Conservation Division
Of the
State Corporation Commission
Before the
House Committee on the Environment
February 9, 2006

Good afternoon, Chair Freeborn and members of the Committee. I am M.L. Korphage, Director, of the Conservation Division of the State Corporation Commission. I am appearing here today to provide comment and background material with regard to HB 2757. This proposed legislation directs the Commission to establish rules and regulations requiring oil and gas operators to notify landowners of spills that are reportable to the Commission. We hope that the background data provided here today will be useful to this Committee in its determinations with respect to this policy issue.

The data that we are providing includes some general information concerning what spill reporting requirements currently exist for oil and gas operators in Kansas, some statistics as to the number of oil field spills being reported to the Commission, and a general overview of how rules and regulations are developed through the Commission's Oil and Gas Advisory Committee.

Exhibit A:

- Regulatory definition for a spill as contained in KCC regulation K.A.R. 82-3-101(68)
- KCC spill notification requirements found in K.A.R. 82-3-603 (b)-(d) including exceptions to reporting requirements for very minor amounts and penalty levels for non-compliance of reporting requirements.
- Federal requirements for spill reporting

Exhibit B:

- A graph of the total number of spill incidents reported to Commission during calendar year 2000 through 2005.

Conservation Division, Finney State Office Building, 130 S. Market, Room 207
Voice 316.337.6200 Fax 316.337.6211 www.kcc.state

- A graph showing the distribution of spill incidents by volume reported to the Commission from 2000 through 2005
- A graph showing the distribution of spill incidents by District field area for spills reported from 2000-2005.

Exhibit C:

- A description of how KCC regulations are developed under requirements of K.S.A. 55-152(a).
- Other information from regulatory programs in adjoining states.

Should the Committee members have any questions either I or staff would be glad to address them.

State Corporation Commission **Exhibit A**
Conservation Division
February 9, 2006
House Committee on the Environment
Ref. HB 2757

K.A.R. 82-3-101. DEFINITIONS.
(a) As used in these regulations, the following definitions shall apply:

(68) "Spill" means any escape of saltwater, oil, or refuse by overflow, seepage, or other means from the vicinity of oil, gas, injection, service, or gas storage wells, or from tanks, pipelines, dikes, or pits, if the wells, tanks, pipelines, dikes, or pits are involved in or related to any of the following:
(A) The exploration or drilling for oil or gas;
(B) the lease storage, treatment, or gathering of oil or gas; or
(C) the drilling, operating, abandonment, or postabandonment of wells. For purposes of this regulation, "vicinity" means the area within six feet of the wellhead.

K.A.R. 82-3-603. SPILL NOTIFICATION AND CLEANUP; PENALTY; LEASE MAINTENANCE.
(b) Notification: when required.

(1) Threat to surface water or groundwater. Each operator shall notify the appropriate district office in accordance with subsection (c) immediately upon discovery or knowledge of any escape of saltwater, oil, or refuse that has or threatens to reach surface water or to impact groundwater. The operator shall take immediate action in accordance with procedures specified or approved by the district office to contain and prevent the saltwater, oil, or refuse from reaching surface water or impacting groundwater.
(2) Timely notification of spills. Except as otherwise specified in this regulation, the operator shall notify the appropriate district of any escape of saltwater, oil, or refuse that meets the definition of "spill" in K.A.R. 82-3-101. This notification shall meet the requirements of subsection (c) and shall be made no later than the next business day following the date of discovery or knowledge of the spill.
(3) Exception for minor leaks and drips. The notification requirement for spills in paragraph (b)(2) shall not apply to very minor amounts of saltwater, oil, or refuse, that unavoidably or unintentionally leak or drip from pumps, machinery, pipes, valves, fittings, or well rods or tubing during the conduct of normal prudent operations and that are not confined in dikes or pits or within the vicinity of the well. However, this exception shall not apply to ongoing, continual, or repeated leaks or drips, or to leaks or drips that are the result of intentional spillage or abnormal operations, including unrepaired or improperly maintained pumps, machinery, pipes, valves, and fittings.

(4) "Discovery or knowledge" defined. For purposes of this regulation, the point of "discovery or knowledge" shall mean that point when the operator knew or reasonably should have known of the spill or escape.
(c) Information required with notification. The notification requirement in subsection (b) shall include the following information:
(1) The operator's name and license number;
(2) the lease name and legal description and the approximate spill location;
(3) the time and date the spill occurred;
(4) a description of the escaped materials, including type and amount;
(5) a description of the circumstances creating the spill;
(6) the location of the spill with respect to the nearest fresh and usable water resources;
(7) the proposed method for containing and cleaning up the spill; and
(8) any other information that the commission may require.
(d) Penalty for failure to notify. The notification requirement in subsection (b) shall apply even if the operator knows or believes that the appropriate district office is already aware of the spill or escape. The failure to comply with subsection (b) shall be punishable by a $250 penalty for the first violation, a $500 penalty for the second violation, and a $1,000 penalty and an operator license review for the third violation.

FEDERAL REQUIREMENTS FOR OIL SPILL REPORTING

• Clean Water Act (CWA) § 311(b)(5) provides in part:

> Any person in charge of a vessel or of an onshore facility or an offshore facility shall, as soon as he has knowledge of any discharge [defined as including, but not limited to, any spilling, leaking, pumping, pouring, emitting, emptying or dumping, with a number of exclusions] of oil or a hazardous substance from such vessel or facility in violation of paragraph (3) of this subsection, immediately notify the appropriate agency of the Unites States Government of such discharge. 33 U.S.C. § 1321(b)(5).

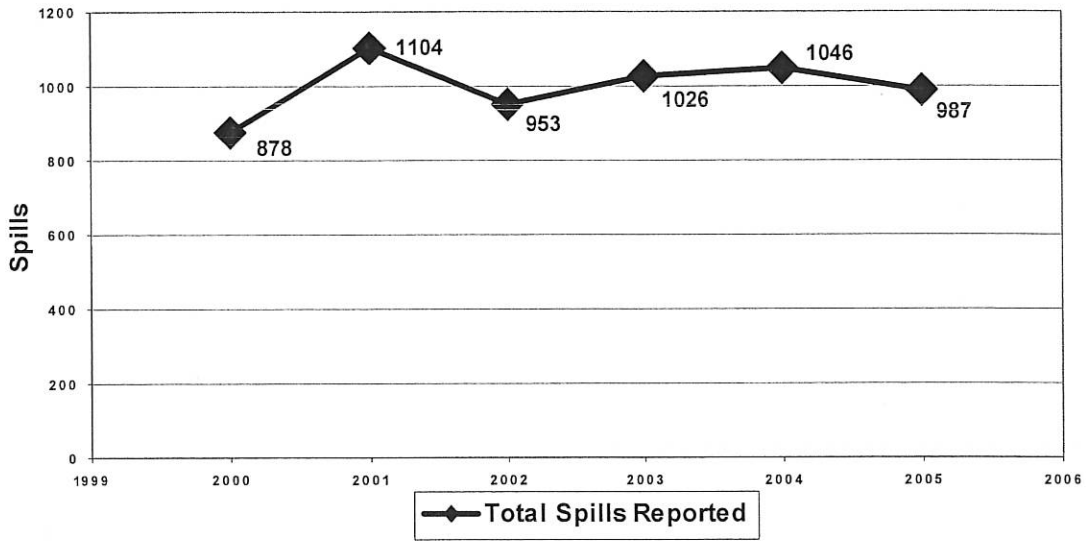
• By U.S. Environmental Protection Agency regulation, reports must be made to the National Response Center at 800-424-8802. 40 C.F.R. § 110.6.

• Failure to report is a criminal act, punishable by fine and up to 5-year imprisonment. 33 U.S.C. § 1321(b)(5).

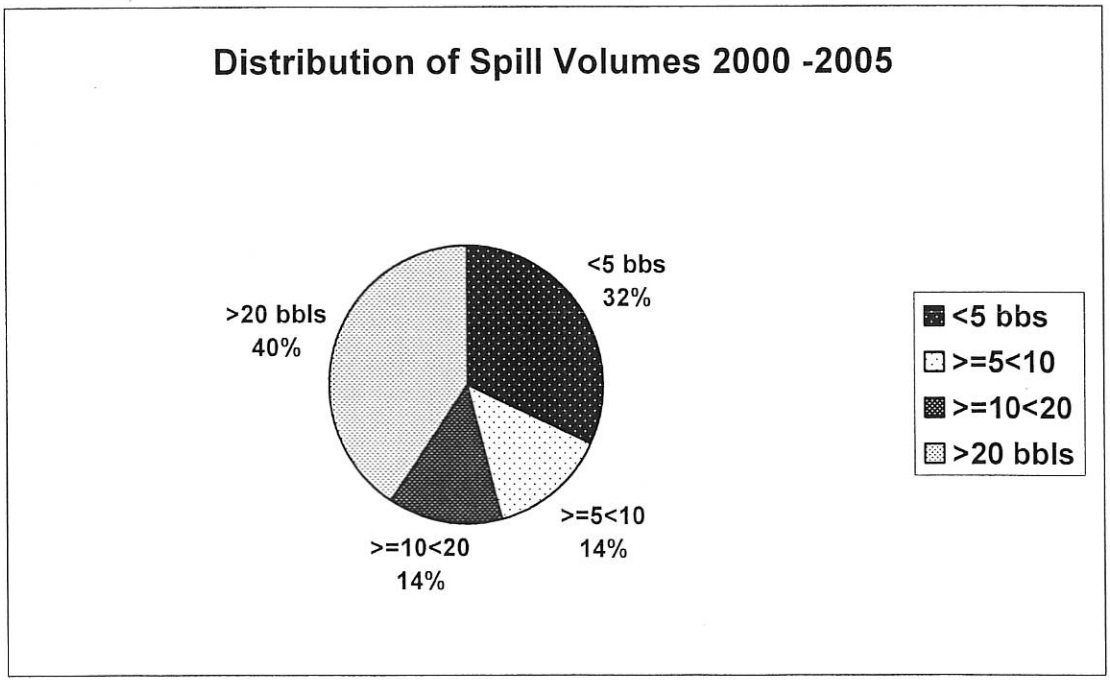
State Corporation Commission
Conservation Division
February 9, 2006
House Committee on the Environment
Ref. HB 2757

Exhibit B

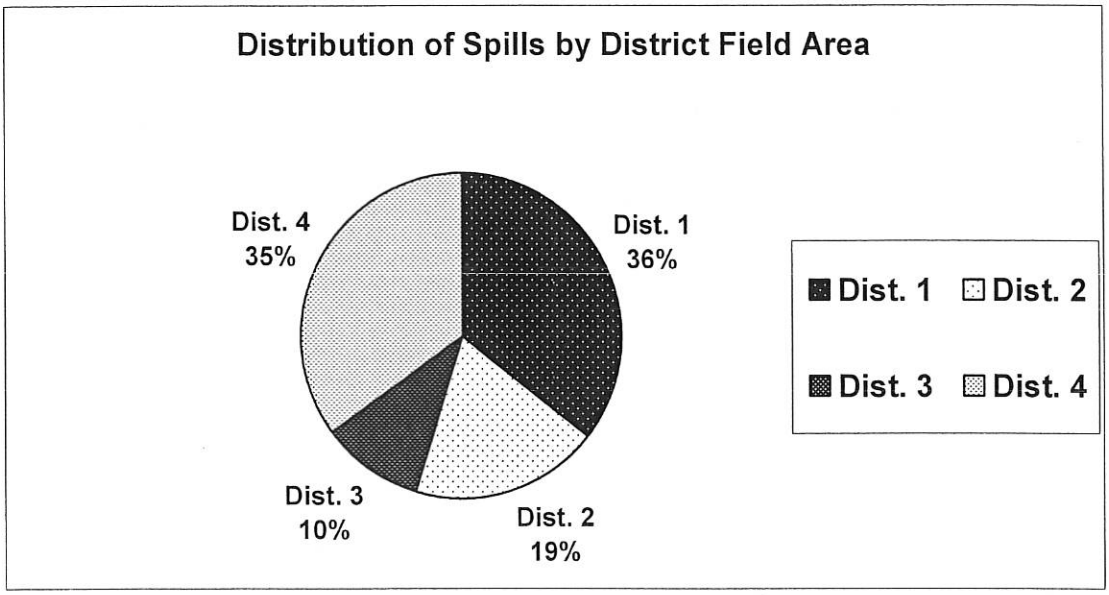
Total Spills Reported to KCC



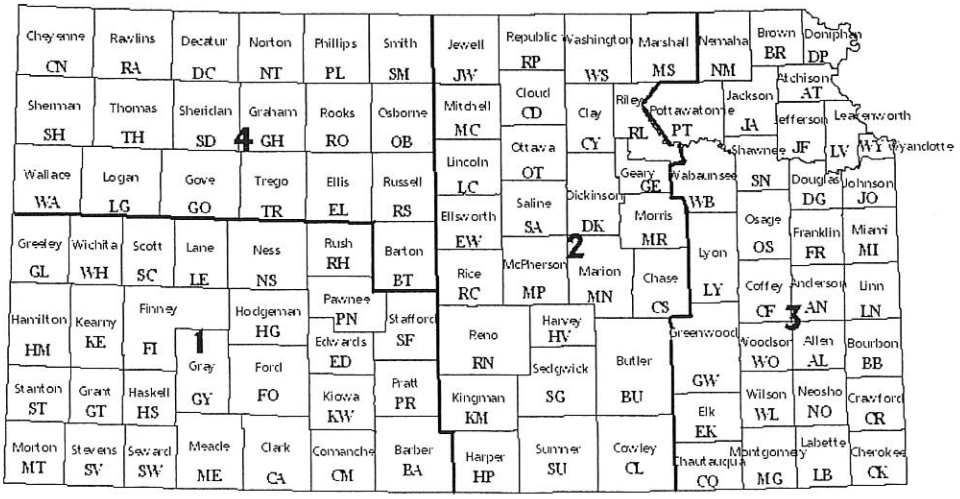
Distribution of Spill Volumes 2000 -2005



State Corporation Commission
Conservation Division
February 9, 2006
House Committee on the Environment
Ref. HB 2757 - Exhibit B, Page 2



District Field Areas



State Corporation Commission **Exhibit C**
Conservation Division
February 9, 2006
House Committee on the Environment
Ref. HB 2757

K.S.A. 55-152. Rules and regulations; recommendations of advisory committee; annual review of drilling methods.
(a) The commission shall adopt such rules and regulations necessary for the implementation of this act including provisions for the construction, operation and abandonment of any well and the protection of the usable water of this state from any actual or potential pollution from any well. Any such rules and regulations relating to wells providing cathodic protection to prevent corrosion to lines shall not preempt existing standards and policies adopted by the board of directors of a groundwater management district if such standards and policies provide protection of fresh water to a degree equal to or greater than that provided by such rules and regulations. No rules and regulations promulgated pursuant to this section shall be adopted by the commission until recommendations have been received from the advisory committee established by K.S.A. 55-153, and amendments thereto.

Process of regulation development:

- Issue for regulation relating to oil and gas activities originates within or is assigned to the Oil and Gas Advisory Committee
- Issue is delegated to the Rules and Regulations Sub-committee
- Rules and Regulations Sub-committee researches the issue and develops language for proposed regulations
- Proposed regulations are referred back to the Oil and Gas Advisory Committee for its recommendations
- Proposed regulations are sent through the Secretary of Administration and the Attorney General for approval
- Proposed regulations are reviewed with the Joint Committee on Administrative Rules and Regulations
- State Corporation Commission (Commission) holds a public hearing on the proposed regulations
- Post-hearing changes are made as needed, any changes must be approved by the Secretary of Administration and Attorney General, and substantial changes require a subsequent public hearing
- Regulations are adopted by the Commission

Regulations and associated documents are filed with the Secretary of State

State Corporation Commission
Conservation Division
February 9, 2006
House Committee on the Environment
Ref. HB 2757 - Exhibit C: Page 2

Information concerning landowner notification regulatory requirements in adjoining states:

Oklahoma – Oklahoma Corporation Commission

No landowner notification requirements. Legislation has been proposed in the past, but was opposed by Oklahoma Corporation Commission Staff and Industry due to the perceived problems with enforcing the legislation.

Colorado – Colorado Oil and Gas Conservation Commission

906.c. SPILLS AND RELEASES—
Surface owner notification and consultation.
The operator shall make good faith efforts to notify and consult with the surface owner prior to commencing operations to remediate E&P [exploration and production] waste from a spill/release in an area not being utilized for oil and gas operations.

Nebraska - Nebraska Oil and Gas Conservation Commission

No landowner notification requirements