



Cooperative Extension

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WATERLINE

WATER MANAGEMENT ISSUES

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Aug.-Sept. 2001

Coping with Lowered Well Head Gas Pressure and Declining Aquifer

Farmers of Southwestern Kansas enjoy what it takes to grow crops - water, energy, and suitable land. The Ogallala aquifer provides water and from much deeper geologic formation the natural gas resource from Hugoton Gas Field fuels nearly 10,000 irrigation wells that pump water for irrigation.

Lately, some farmers are experiencing declining water level in Ogallala and reduced gas pressure affecting operation of pumps. Most irrigators get their gas at the well head through their own pipeline. As long as the gas reservoir pressures are higher than atmospheric pressure at soil surface (14.7 psi), gas will flow. About 8 psi are required at the motor to run an irrigation pump. In the early days of development farmers could get 40 to 80 psi at their motor without difficulty, even though they ran gas through 1 1/4 to 2 inch pipes for a distance up to 2 miles. Hugoton gas pressures were around 200 psi which have fallen to around 80/90 psi. At the current rate of decline, pretty soon the pressure will be so low that the cost of bringing the gas up will be prohibitive. Grant, Stanton, and Stevens county producers get their natural gas from the Hugoton gas field. Natural gas companies have built compressor stations which spells trouble for the agricultural users.

One of the options for the agricultural producers is to group together to form a cooperative to buy gas from large suppliers. A relatively new legislation allows a producers cooperative to become a Non Profit Utility (NPU) to be managed similar to utility and farm service cooperatives. The NPU has to file with the Kansas Corporation Commission and prove their intentions are sincere. One advantage of the NPU is that the Board of Directors may hire a broker to purchase their natural gas at the lowest rate by trading in the commodity markets and various other efforts. The NPU would be in a position to bargain for gas price.

Eight NPUs were formed in Grant and Stevens counties, which have been operating for several years now. Counties needing to learn about how to cope with lowered well head gas pressure and formation of NPUs may contact: Larry Kepley at (620)356-1559 or (785)565-1963, another contact would be M.J Consulting at (620)544-4993.

Why SDI?

A Technology Field Day was held in Colby at the Northwest Research-Extension Center. 200 plus people attended the Field Day with participants showing up from neighboring states. Interest in Subsurface Drip Irrigation (SDI) is rising.

Irrigated agriculture is stuck between rock and a hard place according to Sandra Postel of World Watch organization and author of Pillar of Sand. We are counting on irrigated agriculture to feed the world population that will double before the close of the next century. At the same time, we are hoping to shift water away from agriculture to satisfy rapidly growing urban and industrial demands, restore fish and wildlife, save endangered species, protect ecological functions of rivers and wetlands, and provide water for recreation as well.

Closer to home in the High Plains we are using groundwater from Ogallala Aquifer. The water level of this aquifer is declining. The recharge of the aquifer is very limited. With the present day rate of pumping, the water level will fall below the economic level of pumping for irrigated agriculture by 2050. We need to extend the usable life of the Ogallala Aquifer by reducing pumping without losing the economic base. It depends on our ability to do more with less water. We need to consider SDI as an alternative. For additional information, please contact Mahbub Alam, K-State Research and Extension Irrigation Specialist at (620)275-9164 or e-mail at malam@oznet.ksu.edu

Kansas State Conservation Commission Joins Hands with K-State Research and Extension for Irrigation Initiatives

The State Conservation Commission has announced FY 2002 allocation for Water Resources Cost-Share Program.

Table with 2 columns: Allocation Category and Amount. Includes District Needs Allocation (DNA), Irrigation Initiative Allocation (IIA), Irrigation Initiative Reserve Allocation-SDI, Irrig. Initiative Res. Allocation-Rattlesnake, Technical Assistance, TMDL Allocation, Priority Reserve, and Water Quality Allocation (WQA).

Total \$4,450,000

***Irrigation Initiative Reserve Allocation-IIA
FY 2002 Program Revisions**

- Reserve allocation for Sub-Surface Drip Irrigation (SDI) supplemental funding to districts for demonstration projects.
- Non-metered systems and systems with end guns will incur a state cost-share limit of 50% or less up to a landowner limit of \$2,000 per system.
- Cost-sharing on SDI on pivot corners is eligible. Cost-share will be limited to one system per landowner. Cost-share will be limited to the two corners closest to the pump unit.
- SDI systems will receive top priority for funding provided the system addresses 30 or more acres.

County wise Allocation

County	TMDL Allocation	Irrigation Allocation	NPS* Allocation
Clark			\$10,091
Comanche	\$993		\$13,513
Edwards	\$11,338	\$14,260	\$22,500
Finney	\$28,329	\$24,000	\$42,144
Ford	\$13,664	\$12,746	\$38,145
Grant		\$16,240	\$7,105
Gray	\$11,702	\$22,544	\$15,351
Greeley		\$8,125	\$12,334
Hamilton		\$8,296	\$19,281
Haskell		\$23,506	\$10,091
Hodgeman	\$39,847	\$8,146	\$11,700
Kearny	\$793	\$14,691	\$27,799
Kiowa	\$20,229	\$10,369	\$20,550
Lane	\$5,508		\$20,492
Meade		\$16,812	\$10,091
Morton		\$9,819	\$17,534
Ness	\$27,612	\$6,189	\$15,675
Pawnee	\$9,604	\$11,462	\$18,489
Rush		\$6,531	\$20,875
Scott		\$10,171	\$19,061
Seward		\$16,349	\$13,455
Stanton		\$16,212	\$0.
Stevens		\$19,083	\$14,576
Wichita		\$11,381	\$19,700
Total	\$169,619	\$286,932	\$420,552

***Irrigation Initiative Pilot Program**

Irrigation Management:

- Up to Six pilot counties in south central and southwest Kansas.
- Projects in association with K-State Research and Extension (Mobile Irrigation Lab)
 - System Efficiency Evaluations
 - Landowner training on ET Based Scheduling Program and cropping systems.
 - Target large quantity water users and irrigation system cost-share recipients
- Technical assistance need identified

Mobile Irrigation Lab

The mobile lab is equipped to conduct on site educational program on use of KANSCHED irrigation scheduling, and pumping cost evaluation soft wares. It is also equipped with "Irrigages" for center pivot sprinkler evaluation.

Several County Extension Agents and USDA-NRCS personnel have taken the opportunity to familiarize themselves on the use of Mobile Irrigation Lab (MIL). The MIL is available for conducting hands on training to agricultural consultants and producers.

The County Extension Agents are requested to consider including the MIL for their upcoming winter meetings.



Picture showing Mobile Irrigation Lab. Displayed at Fall Field Day at Garden City, SW Research-Extension Center

Reconnaissance Sampling of High Plains Aquifer for Ground-Water Age Dating

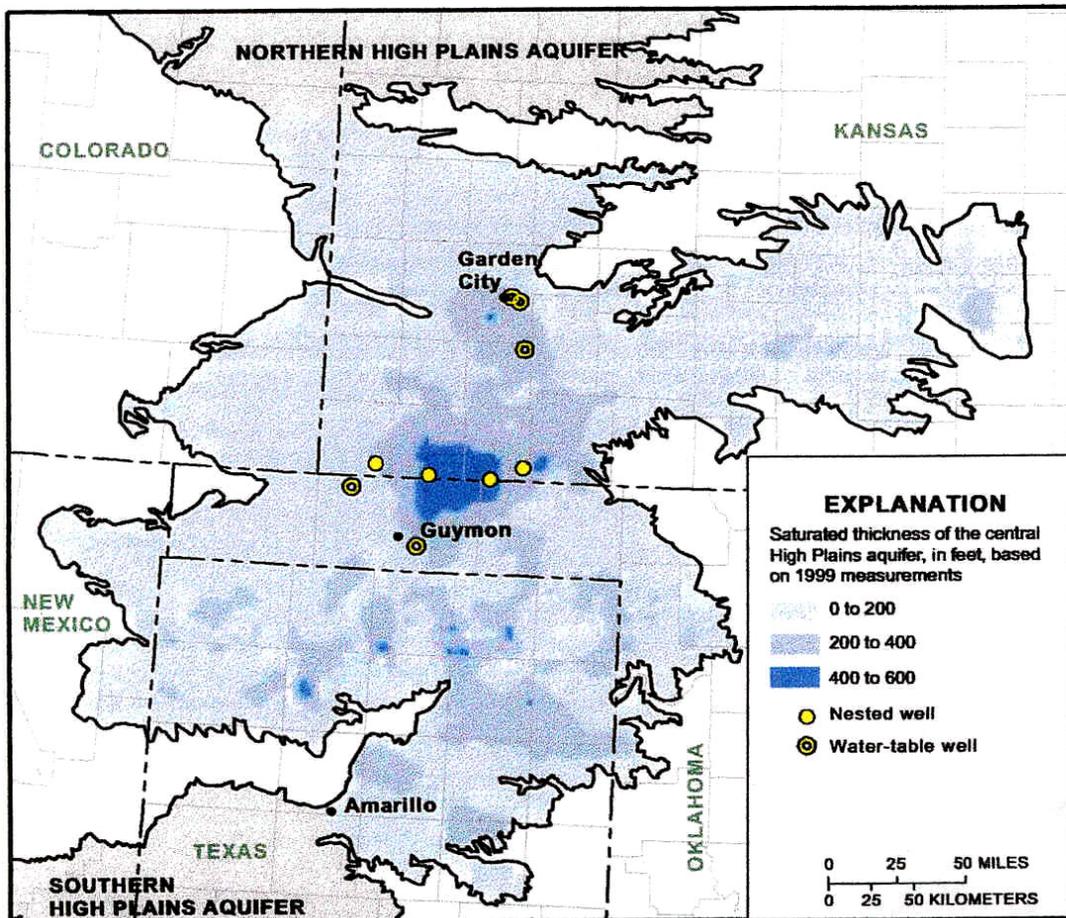
A reconnaissance sampling effort was conducted to determine if recently recharged water exists at the water table of High Plains Aquifer. Five wells were installed (see map), sampled, and analyzed to observe presence of compounds related to human activities and several ground-water age-dating indicators.

- Tritium was detected at higher than background levels in four of the five monitoring wells which indicates that at least some recently recharged (<50 years) ground water exists at the water table in this part of the Ogallala Formation.
- Pesticides or their degradation products were detected in four of the five water samples. The most commonly detected pesticide also were some of the most heavily applied pesticides. Thus, the data indicated that the Ogallala Formation did contain recently recharged ground water that was affected by agricultural activities.

- One water sample contained a pesticide concentration (atrazine at 5.0 ppb/parts per billion) that exceeded a drinking water standard (3 ppb).
- Nitrate concentrations in all 5 wells were above the national background level (3ppm) and are indicative of a human influence on the quality of ground-water recharge.

This information was taken from:

http://co.water.usgs.gov/nawqa/hpgw/sigfinds/RECONFIN_DS.html



Saturated thickness of the central High Plains aquifer and locations of monitoring wells. Thicknesses based on 1999 water-level measurements and U.S. Geological Survey base-aquifer map (V.L. McGuire, U.S. Geological Survey, written commun., 2000; Gutentag and others, 1984).

Just the Facts

- ❖ Creation of cement-concrete opened the door for dams and the diversion of water for irrigation and large scale irrigated agriculture became possible. This was the era of ditches and flood irrigation.
- ❖ Development of deep well turbine pump, high speed internal combustion engines, and availability of natural gas revolutionized irrigated agriculture in Kansas and the High Plains by tapping groundwater from Ogallala Aquifer.
- ❖ Development of PVC pipes and later surge irrigation technique contributed to the improvement of the efficiency of flood irrigation.
- ❖ Invention of "Self-Propelled Sprinkling Irrigating Apparatus" or center-pivot by Frank Zyback in 1948 changed the landscape in the High Plains. Center-pivot sprinkler irrigation system tremendously improved irrigation efficiency.
- ❖ Development of polyethylene after World War II paved the way for another revolution in water use. Use of drip tubes with emitters or holes spaced out in equal intervals has made it possible to achieve light irrigation efficiency and improved distribution uniformity of 95% or above.
- ❖ 40% of the world food comes from 17% of irrigated cropland. To grow this amount of food without irrigation, we would have to sacrifice a vast area of existing forests and grasslands.
- ❖ 650 million acres are irrigated worldwide, out of which 62 million acres are in the USA. Out of this 62 million, about 4 million acres are in low flow systems which include: Micro-Sprinkler, Surface Drip, Sub-Surface Drip, and Buried Perforated Tapes. Out of the 4 million low flow systems, about 320 thousand acres are in Sub-Surface Drip Irrigation (SDI) and another 14 thousand are in Buried Perforated Tape.
- ❖ K-State study using subsurface drip irrigation shows that total irrigation diversion can be reduced by 25%.
- ❖ Worldwide total of Sub-Surface Drip Irrigation (SDI) is about 7 million acres. Sub-Surface Drip Irrigation acreage in Kansas is estimated at about 5,000 acres.

Converting Corn Silage Yield to Grain Yield

From time to time, there is a need to convert corn silage yield to grain yield. There are some rule of thumb conversions, however, it is important to remember that these conversions account for converting 30 to 35% drymatter silage to 84.5% drymatter grain (15% moisture).

One can make the conversion if you remember that corn silage is approximately 45% grain. If a single factor (example 7.0) is being used to convert wet silage to grain, we are not accounting for any change in silage moisture, however, seven is not going to be too far off if silage is 65% moisture or slightly dryer.

Method one (preferred method if silage moistures are known)

1. Convert silage yield to pounds of drymatter.
2. Multiply the drymatter weight *0.45.
3. Divide that weight by 47.32. (weight of a bushel of corn at 0% moisture and will convert bushels back to 15.5% moisture.

Convert 30 Ton silage at 65% moisture to grain yield at 15.5% moisture;

1. (30 ton) 60000 * 0.35 = 21000 lb drymatter
2. 21000 * 0.45 = 9450 lbs 0% H₂O grain corn
3. 9450 / 47.32 = 199.7 bu/a grain at 15.5% H₂O

Method two

Wet silage conversion factors:

Corn silage at 65% moisture conv. Factor = 6.66
30 ton silage * 6.66 = 199.8 bu/a grain at 15.5% moisture

Corn silage at 70% moisture conv. factor = 5.7
30 ton silage * 5.7 = 171.17 bu/a grain at 15.5% moisture

All of these conversions are only relative and are not absolute. The 45% factor for silage to grain is an average and could be more or less depending on the hybrid, growing conditions, damage to crop by hail or insects etc. Currently this is the most accurate information that I had available.