

WATER CONSERVATION EFFORTS IN NW KANSAS

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Water Conservation Projects

Water conservation efforts in NW Kansas have taken several forms over the recent few years. These efforts include the formation of the SD-6 Local Enhanced Management Area (LEMA), the proposed District-wide LEMA, soil moisture probe cost shares, and collaboration with NW Tech in Goodland for technology farms.

SD-6 LEMA

The SD-6 LEMA was originally formed in 2013 for a 5 year period. It covers approximately 99 sections in western Sheridan County and a small portion of eastern Thomas County. The LEMA includes approximately 193 wells. The use type breakdown of these wells is 183 irrigation wells, 7 stock wells, 2 multi-use wells, and 1 recreation well.

The original LEMA was formed after an extended period of meetings with the local stakeholders. During that period work was stopped until the Kansas Legislature passed the LEMA legislation. This legislation is similar to the IGUCA law but a significant difference is that the plan is submitted by a GMD Board. The plan, if accepted by the Chief Engineer, could only be modified by the district thereby eliminating the possibility that a plan could change after it was out of the Board's hands. GMD #4 was very active in the formulation and passage of this legislation.

The original order of decision for SD-6 was signed by the Chief Engineer on December 31, 2012, and the order of designation for the SD-6 LEMA was issued on April 17, 2013. It authorized the operation of the LEMA through December 31, 2017. The original goal for the LEMA was to limit pumping from all wells to a maximum of 114,000 acre-feet for the 5 year period (22,800 acre-feet per year average).

As of the preparation date of this paper irrigation usage for the 1st 5-year period was approximately 89,000 acre-feet while non-irrigated use is estimated to be approximately 3,000 acre-feet. This total of 92,000 acre-feet is substantially less than the 114,000 acre-feet goal.

Water table measurements for the 5-year period have shown a marked improvement, and do show that the reduced use of water has resulted in a lessening in the decline rate of the area.

I've included 4 graphics that depict annual amounts pumped, observation well data, and a scatter plot of amounts pumped vs declines.

The scatter plot graphic represents a methodology that was developed by the KGS to approximate possible pumping levels that would be required to reach a stabilized water table. The R squared value of the trend line shows that 81% of the water table declines are caused by the pumping within SD-6. If the trend line is extended to the zero decline line it can be estimated that approximately 15000 AF annual pumping could come close to stabilizing the water table in the area.

Dr. Bill Golden of KSU has been studying the economic impact of this reduced usage and has found in the 1st 4 years that cash flow values in the SD-6 area are nearly the same as cash flow values of the immediate surrounding area, indicating that these reductions have had little if any adverse impact on the area.

In late 2016 the advisory committee met and recommended that the SD-6 LEMA be re-introduced for another 5-year period (2018-2022). Part of this recommendation was to institute a carry-over amount equaling a maximum of 1 inch per acre per year to users who had water remaining in their accounts. Based on this recommendation, GMD 4 requested a new LEMA from DWR and the hearings on this new LEMA were held in Hoxie on May 31, 2017. The final Order of Designation which included the carry-over provisions was signed by the Chief Engineer on November 7, 2017.

The first 5 years of the SD-6 LEMA have been successful. Producers have adapted to the changes in water allocations, and their cash-flow has remained basically the same. The water table measurements have shown a reduction in the decline rate. There was no dissenting testimony given in the hearings held for the initiation of a 2nd LEMA.

DISTRICT-WIDE LEMA

The procedure for the district-wide LEMA was different from that of the SD-6 LEMA. The board passed a goal statement which read: "By 2016, the GMD 4 Board will have in place a system that establishes "conservation water use amounts" for all of GMD 4. This system will include clearly defined areas and triggers under which current pumpage levels will be required to be reduced in order to come into compliance with these established conservation water use amounts. This system will be established by BOARD ACTION and will be included in the GMD 4 Management Program. The system will replace the current high priority area protocol, but will continue to ensure that any needed controls are based on hydrologic and water use parameters. If possible, flexibility shall be afforded so that various allocation alternatives are available for use in any given area."

The district-wide LEMA was a board driven process. There was a more restrictive plan presented to the public in 4 public meetings held in late March 2016. Based on public input from those meetings, and after looking at several alternative plans, the board made the requirements less severe and presented the new plan to 4 public meetings in late November and early December 2016 which were noticed to all water use correspondents in the district. A final, somewhat less restrictive, map was adopted. This final map removed all alluvial wells from the section level database and did not take into account any section that showed less than 15 feet of saturated thickness.

At the time of this preparation the district-wide LEMA is a work in progress. The request for the LEMA was sent from the board to DWR in June 2017. The Chief Engineer found the proposal met the initial statutory bars and scheduled the 1st of the 2 required hearings for August 23, 2017, in Colby. After

hearing all of the oral and written testimony the hearing officer found that the 3 questions required by law (1- whether declines are occurring or have occurred, or whether withdrawals exceed recharge, 2- whether it is in the public interest to institute corrective control provisions, and 3- whether the boundaries are reasonable) were sufficiently answered and issued an order on Initial Requirements on September 23, 2017. Subsequently the Chief Engineer set the 2nd hearing date for November 14, 2017.

The 2nd hearing was held on November 14, 2017. With cross examination of witnesses being allowed a very full basis of the plan was presented to the Chief Engineer. The Chief Engineer kept the record open until December 22, 2017, and a final decision is required within 120 days after that.

AUTOMATED SOIL MOISTURE PROBE COST-SHARE PROGRAM

Since 2015 the Northwest Kansas Groundwater Conservation Foundation has funded a cost-share program for soil moisture probes. The program has provided a \$1000 cost-share towards the soil moisture probe of the applicant's choice. Approximately 125 new probes have been installed through the course of the program.

Outside research has shown that, with the proper use and trust of soil moisture probes reductions in the amount of water applied annually can be as much as 20%. Preliminary data in our office shows that, on average, awarded applicants of the program in 2015 used 19% less water in the two years after probe installation as compared with the two years prior. This is preliminary data and needs to be further studied in terms of precipitation and crop types, but it does show an encouraging trend.

There are many varieties of soil moisture probes that come with a varying degree of cost and services. The more expensive probes are about \$2500 and are reviewed weekly by a specialist who provides the producer with recommendations on when to turn on and turn off their irrigation. The least expensive probes are about \$1000 and it is up to the producer to analyze their own data for decision making through an app available for any smart phone and tablet.

It should be noted that the use of automated probes introduces new technology in the way that soil moisture is monitored, but that the underlying basics of matching irrigation applications to crop needs and available precipitation is not new. The probes simply make the use of the data easier.

COLLABORATION WITH NW TECH

In 2016 Northwest Technical College in Goodland, Kansas began a Precision Agriculture program that is quickly expanding. This program educates students with hands-on experiences in installing, maintaining, and troubleshooting agriculture technology. To assist with their efforts, the Northwest Groundwater Conservation Foundation has provided full funds for 10 soil moisture probes. In partnership with the Kansas Water Office and their funding, NW Tech has been able to have students install these probes and Variable Rate Irrigation technology in local fields called Water Technology Farms. The students also maintain and monitor this equipment while learning about how to use them for water conservation. More technology equates to more water conservation and the students are learning a trade that will be an expanding job market in the area.