Testimony

RE: SD-6 LEMA Proposal

My name is Wayne Bossert and I'll be presenting this testimony on behalf of the board of directors of the Northwest Kansas Groundwater Management District No. 4.

Per SB 310 of the 2012 Legislative Session,, there are 3 findings of fact that must be considered in this initial public hearing.

Our testimony today will focus on each of these three findings of fact in the hopes that your report to the chief engineer will be favorable on all three findings.

The first issue is Whether one or more of the circumstances specified in subsection (a) through (d) of K.S.A. 82a-1036 exist:

These circumstances are:

(a) Groundwater levels in the area in question are declining or have declined excessively;

(b) the rate of withdrawal of groundwater within the area in question equals or exceeds the rate of recharge;

(c) preventable waste of water is occurring or may occur within the area; and

(d) unreasonable deterioration of the quality of water is occurring or may occur.

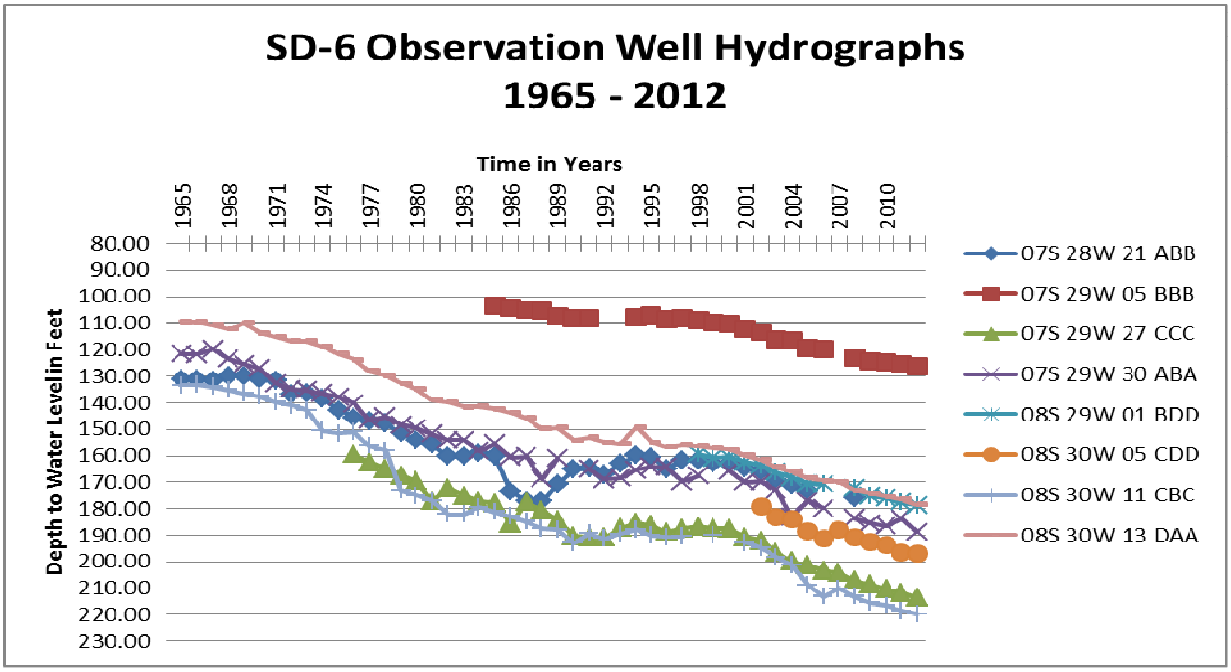
In support of the GMD4 contention that groundwater withdrawals exceed natural recharge in this LEMA,, and as a result,, the groundwater levels are declining,, the district offers data from the Kansas Cooperative Annual Water Level Measurement Program which is attached to our written testimony as Appendix 1.

The source of this data is from the Kansas Geological Survey Water Information Storage and Retrieval Database.

Of the full data set within GMD 4, there are 8 observation wells located within the SD-6 LEMA that have sufficient annual water level measurements to be useful. They're listed in our written testimony.

The annual water level measurement data for those eight observation wells has been plotted on a graph --- also provided in the written testimony --- which shows that each of these wells has declined over the time frame of the graph --- with several of them showing a 60-70 feet decline.

Only when withdrawals exceed recharge do these kind of negative changes in groundwater levels, and consequently, loss of aquifer storage occur over such a long period of time.



Graph 1: SD-6 Observation Well Hydrographs – 1965 - 2012

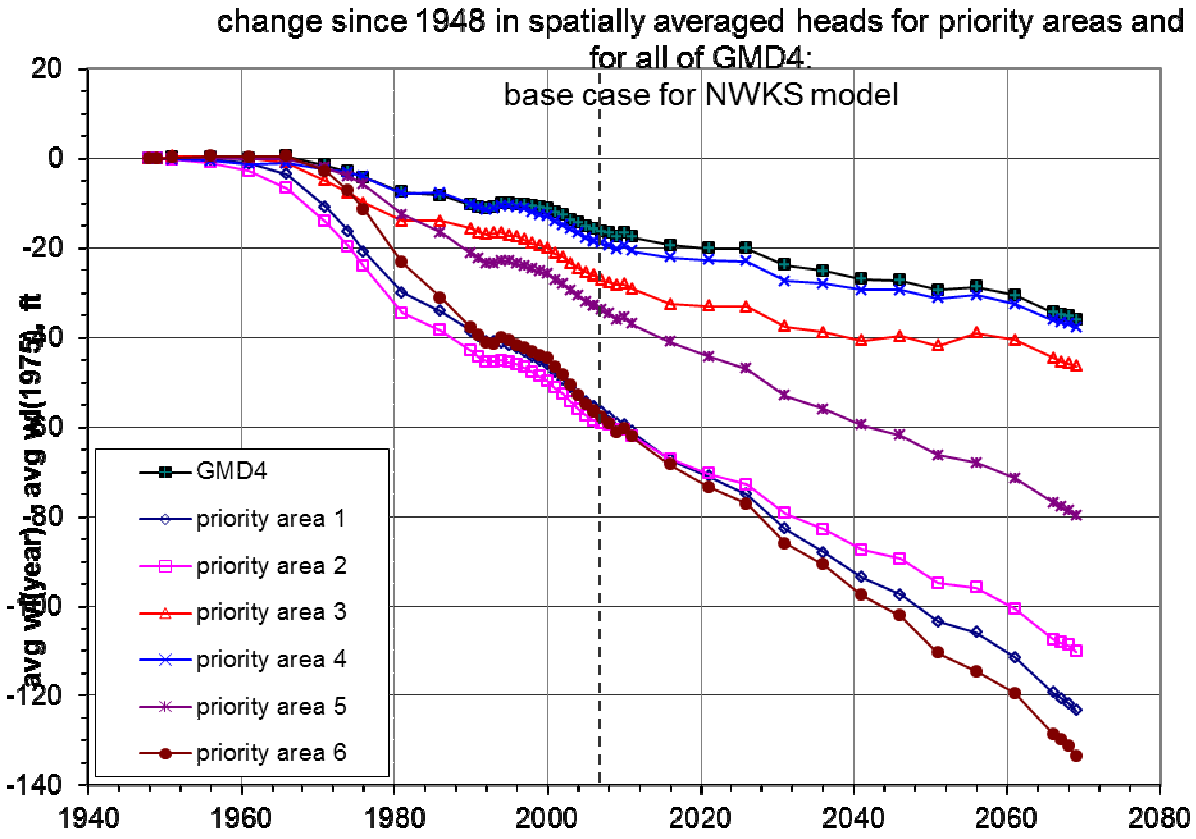
Additionally, modeling done by the GMD confirms the observation well data.

In cooperation with state and federal agencies,, the Republican River Compact Administration's Modflow computer model was updated and newly calibrated for NW Kansas GMD 4 by S.S. Papadopulos & Associates.[1]

This new version of the Compact Administration's model --- called the Northwest Kansas Model --- was designed to look at future trends of any or all six of the GMD 4 HPA's.

Each HPA's pumpage since 1948 was run in the model and calibrated to the known water level data.

Our Graph 2 --- provided in the written testimony --- shows a clear declining trend starting around 1970 and continuing thereafter for the SD-6 LEMA.



Graph 2: Modeled runs of GMD 4 six HPAs - 1948 – 2070 – status quo scenario

[1] See Northwest Kansas Model Report attached as Appendix 7

Between the Kansas Cooperative Annual Water Level Monitoring Network data,, and the hydrologic modeling done for this area with the Northwest Kansas Model,, GMD 4 contends that the water levels are declining in the SD-6 LEMA due to cumulative withdrawals exceeding annual recharge.

The second issue is whether the public interest of K.S.A. 82a-1020 requires one or more corrective control provisions:

K.S.A. 82a-1020 is the Legislative declaration relative to establishing groundwater management districts in Kansas. It declares that in the **public interest** it is necessary and advisable to permit the establishment of GMDs which allow local water users to determine their own destiny with respect to the use of groundwater -- insofar as that destiny does not conflict with the basic laws and policies of the state.

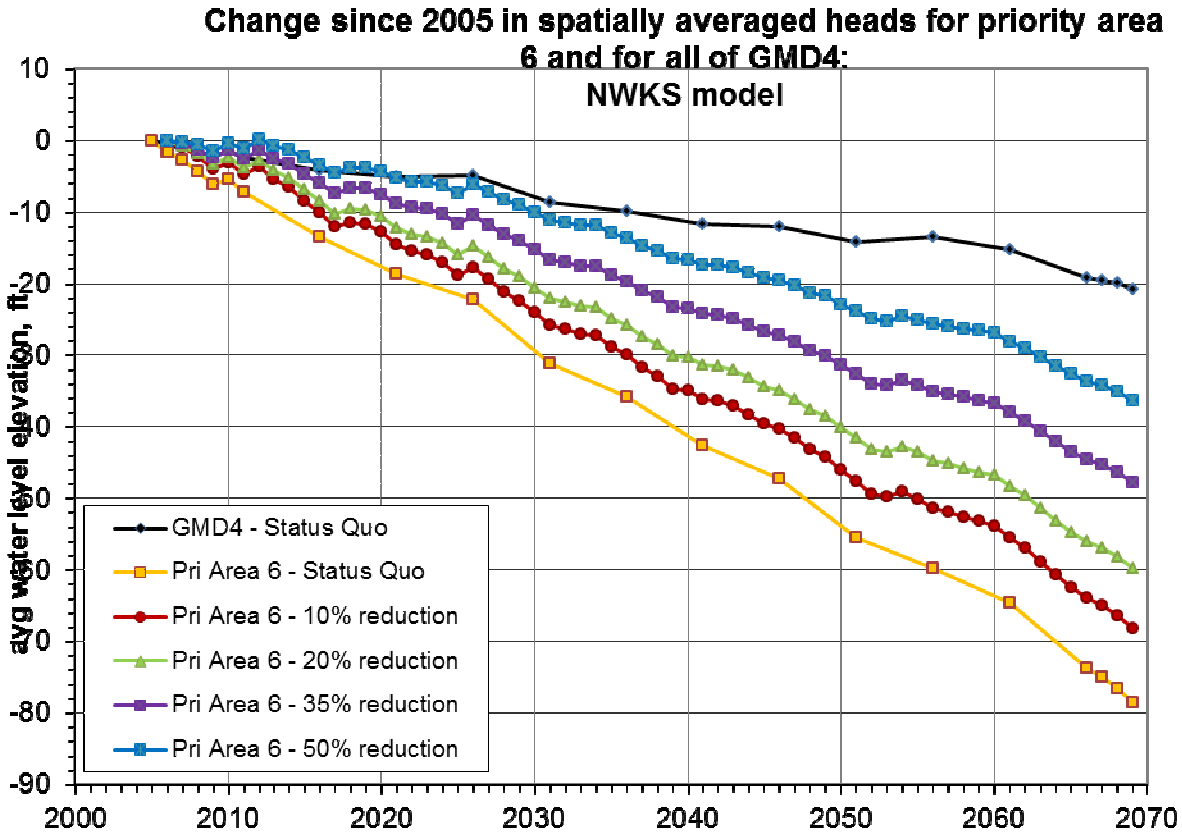
So long as the LEMA process comes from the local water users, and whatever corrective control provisions are requested out of that process are consistent with state law, then GMD 4 contends that the public interest of K.S.A. 82a-1020 has been satisfied.

The LEMA process in SD-6 took 11 public meetings and two subcommittee work sessions – all held in Hoxie -- between November 10, 2008 and May 9, 2012. These meetings and discussions were facilitated by GMD 4, but the ideas contained in the LEMA proposal, including the corrective control provisions, were those of the local land and water right owners.

Appendix 4 of our written testimony includes the meeting discussion notes and meeting attendance sheets for all the meetings that were kept. While not a complete record of everything discussed, enough of a record exists to clearly demonstrate a significant public involvement process that resulted in the locally developed and locally requested plan the chief engineer is hearing today.

A reading of these meeting notes will show that The Northwest Kansas Model information was made available to the SD-6 stakeholders very early in their discussions upon their request. That information provided evidence to them that the public interest would be served by adoption and implementation of any corrective control provisions that would reduce water use,, and thus extend the life of the regional aquifer.

The model results from reducing pumpage by selected percentages between 0% and 50% in the SD-6 HPA has been included in our written testimony as Graph 3, and projects a slowing of the decline rate with every reduction scenario run.



Graph 3: SD-6 Model runs of water use reduction alternatives – 2005 - 2070

This information was also important in their understanding that some set of corrective control provisions were needed to address the decline problem,, and that whatever corrective control provisions they chose to slow the decline rate would therefore be in their own public interest.

A web page was created to keep the process available to the public and was updated regularly by GMD 4 staff. The process was also covered in no fewer than 37 articles published in 30 editions of the district newsletter between March, 2002 and September, 2012[2].

In summarizing this section of our testimony, it's the contention of GMD 4 that:

[2] See Appendix 5 for full listing of cited newsletters

1) Every invested person was made aware of the process and invited to participate;

2) Ample time was provided to publicly discuss every issue brought up;

3) GMD staff appropriately facilitated the meetings and discussion resulting in a LEMA proposal that has been locally crafted and adopted by the affected stakeholders; and that

4) The public interest as envisioned in K.S.A. 82a-1020 will be served by adoption of the locally derived corrective control provisions included in the LEMA proposal being heard today.

The final issue is whether the geographic boundaries are reasonable.

First to be considered in this question is the need for, or justification for any boundaries at all.

The enhanced management effort began in earnest in early 1999 when the Kansas Legislature passed New Section 15., House Substitute for SB 287 which directed the Kansas Water Authority (KWA) to study and make recommendations on five issues – including: the study of "..aquifer resources, recharge rates,…and the long-term prospects related to any necessary transition to dryland farming in areas of the state to maintain sustainable yield and minimum streamflow levels." This bill eventually became K.S.A. 74-2623.

Under this law, the KWA on January 8, 2001 submitted to the Governor and the Legislature two reports – an Executive Summary and a set of Summary Papers regarding the directives of House Substitute for SB 287. Summary Paper No. 3 (dealing with Aquifer Resources) contains the following recommendations:

> *"*The *hydrogeologic characteristics of the aquifer provide a natural basis for classifying the aquifer into* ***management subunits*** *based on their potential use. In order to preserve the greatest possible social and economic benefits of the ground water resource and to minimize the negative effects of competition for a diminishing resource, the* ***natural aquifer subunits*** *must be evaluated in the light of the trends and changes in the resource over the past three to four decades of intensive ground water development. This combined approach provides bases for* ***identifying and prioritizing aquifer subunits*** *where specific*

> *management activities are most needed in order to preserve a sustainable reserve of water to support the basic social structure of the region."*

On April 12, 2001 the KWA/KWO appointed two special committees - the Management Advisory Committee (MAC) and the Technical Advisory Committee (TAC) – to develop a grass-roots approach to enhanced management in the western Kansas groundwater areas. The MAC and TAC met 7 times that year and produced their report on October 16, 2001[3] -- making the following recommendations:

- ***Delineate the Ogallala Aquifer into aquifer subunits*** *to allow management decisions in areas of similar aquifer characteristics.*
- ***The Groundwater Management Districts and Division of Water Resources should identify each aquifer subunit in decline or suspected decline*** *and establish water-use goals to extend and conserve the life of the Ogallala Aquifer. And*
- ***Identify aquifer subunit priorities*** *to extend the life of the aquifer and sustain the vitality of western Kansas.*

This report produced the new "marching orders" for enhanced management in Kansas,, and GMD 4 began implementing these ideals.

The district developed a 7-task approach to enhanced management which they included into their Revised Management Program – first in 2006, and in every management program since. The overview for this new section states:

> **"**In general accordance with the Kansas State Water Plan, the district will identify **aquifer sub-units** of similar hydrology, prioritize these sub-units, and develop an enhanced management program for the high-priority sub-units identified. **The goal will be to slow the groundwater table decline rate in all high-priority aquifer sub-units identified and to extend the economic life of the local groundwater resources."**

It's clear that the state's direction from the outset has been one of local sub-unit management,, and that the GMD 4 approach has been focused on identifying aquifer sub-units for enhanced management in complete consistency with the state plan and our own management program.

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[3] Final MAC Report attached at Appendix 2.

The other issue to be considered in the reasonableness of the boundaries is: Was a reasonable process used to establish the boundaries?

The GMD 4 board initially started out looking at a suite of approaches to determine the HPA boundary areas. Most of the work eventually gravitated to identifying areas that were showing unreasonable groundwater declines. The question was: How best to identify these areas?

The board's decision was to identify areas of excessive decline by using the observation well network data – known water table data. As such, the root of virtually all data used in establishing the GMD 4 HPAs is the Kansas Cooperative Annual Water Level Measurement Program data -- which has already been explained.

Recognizing that the district was highly variable in saturated thickness, water table elevations, depth to bedrock, rainfall, natural recharge, and every other metric that might be used as a benchmark, they decided the best trigger would be a percentage of change in saturated thickness over a defined time frame that represented a recent, "normal" climate period.

The normal climate period chosen was 1996 through 2002 – the most recent,, 6-year period,, that included 2 drier years, 2 normal years and 2 wetter years of rainfall.

The next decision was how best to use the annual water level measurements – a data for GMD 4 that included approximately 275 wells to characterize the entire 3.11 million acre district area.

The GMD 4 board decided – along with the collaboration and suggestion of KGS -- that section-level data (as opposed to the more limited point data) would represent the best blend of data volume and data accuracy. This would allow the board to consider HPAs down to the section if they created triggers that turned every section either "on" or "off".

The KGS section-level data base is a unique, geospatial data point for the center of each Public Land Survey System Section – starting with its latitude and longitude coordinates. To these data points, any number of additional data attributes can be attached - thus creating a multi-layered data base.

The GMD 4 board asked KGS to generate 4 additional section-level data layers that would apply to the district's enhanced management process. They were:

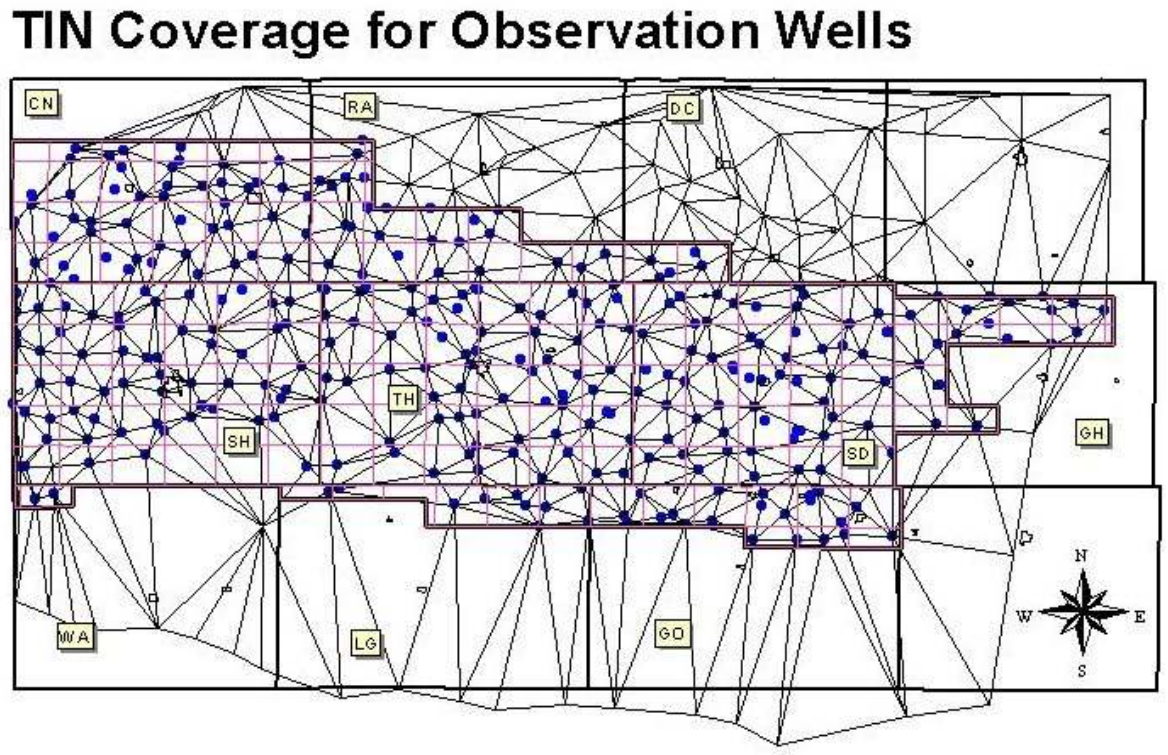
- 1996 water table elevations;
- 2002 water table elevations;
- 1996 through 2002 change in water levels in feet; and
- 1996 through 2002 change in water levels in percent.

In the generation of the water table elevation data sets,, KGS suggested,, and the GMD 4 board agreed,, that 3-year averaging for each annual water table elevation value be used. For example, the section level attribute for the 2002 water level elevation would be the average of the 2001, 2002 and 2003 water level elevation values.

This convention provides additional annual data points where a single year's measurement may be missing,, and also tends to smooth out the data in cases where a few measurements might show an unusual deviation from the previous or subsequent value.

To create the 4 requested section-level data sets from the known point values,, KGS applied a TIN (Triangulated Irregular Network) process -- which assigns the most likely value to the center of each section based on the 3 nearest, known data points.

A map of the TIN triangles used for the GMD 4 process has been included in the written testimony.



As stated earlier, this process provides many more data points and values than by using exclusively the known point data. For example, the approximate 275 known data points for annual water level measurements in GMD 4 become 4,815 data values when the TIN process completes its assignments.

The original section-level data set used by GMD 4 in 2003 has been attached to our written testimony as Appendix 6.

While both the TINing process and the 3-year averaging decision provide more data points, there is some level of reduced accuracy per data point. It was the feeling of the board,, with agreement from KGS,, that the additional data points would improve the process more than the loss of data accuracy would detract from it,, and perhaps even more importantly,, that the accuracy provided by these decisions would be statistically sufficient to reasonably establish priority areas.

At this point the board felt that another trigger was needed help identify areas that had a potential to experience declining conditions. They decided that in addition to the percentage decline rate, any area that had reported annual water use above a trigger value should also be included.

Again with the help of KGS, a 2-mile reported water use density value was assigned to the center of every section in the district. For these values, a grid was placed over the district and the average reported water use for every well within 2 miles was summed and then divided by the 2-mile grid area,, yielding an average reported water use quantity per section. The section-level grid is then placed back over the district and section values are determined from the grid-centered values.

The section-level data exists on the Kansas Geological Survey website – the address of which has been provided in our written testimony -- and can be generated and downloaded by anyone with a computer and a web connection.

The next decision was to tie all these elements together so that not only could priority areas be identified, but that high, medium and low priority areas could be decided as well. For this to be accomplished, the specific triggers needed to be set.

The final designation of the GMD 4 HPAs - their specific boundaries - took multiple decisions over four separate board meetings to accomplish -- as follows:

1) July 13, 2006 when it was decided to use the 1996 – 2002 time frame for declines and reported water use density, and setting the HPA triggers at 9% or more decline and 275 AF or more of reported 2-mile water use density. (the 9% trigger was ultimately chosen because it rendered an area sized appropriately to best apply the voluntary program approach recommended by the MAC report);

2) August 10, 2006 when the sections of less than 15 feet of saturated thickness and less than 25 AF of reported water use density were eliminated;

3) December 14, 2006 when the alternative of allowing a locally requested HPA and the decision to make the HPAs any ¼ Township containing two or more triggered sections was made; and

4) March 8, 2007 when the final designation process was completed and the six HPA final boundaries were set.

These four specific board actions are included in the written testimony as Appendix 9.

The end result of this all was that:

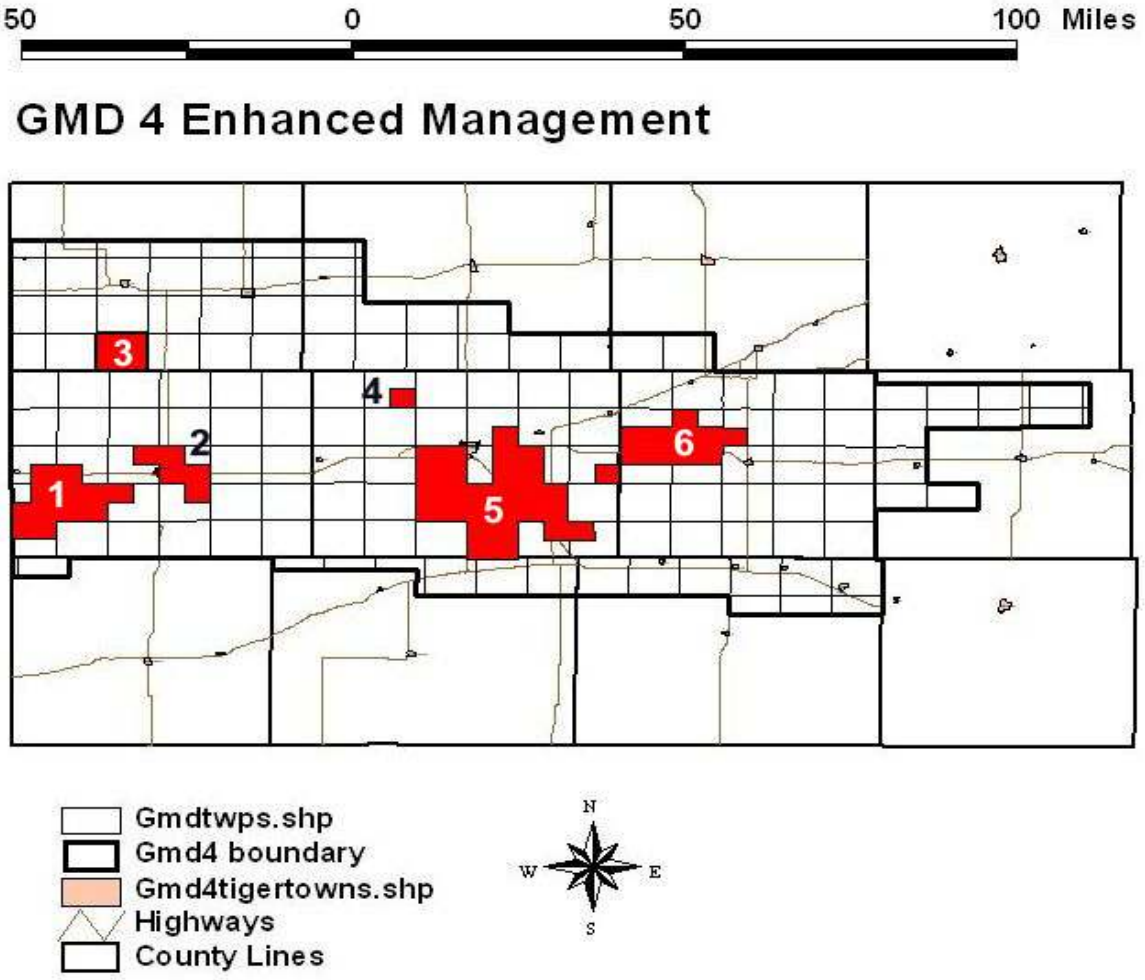
any ¼ Township containing two or more sections having had 9% decline or more between the years 1996 through 2002;

OR, having a 2-mile reported annual water use density of 275 acrefeet or more so long as the triggered sections contained therein had at least 15 feet of saturated thickness and more than 25 acrefeet of reported water use density;

OR, any other area which was locally requested and approved for inclusion by the GMD 4 board;

was designated as a high priority area.

There is a map of the areas meeting these criteria included in the written testimony.



Map 1: Final boundaries of the GMD 4 High Priority Areas – March 8, 2007

Important considerations of this HPA boundary designation process are:

1) The HPA boundaries were established by the GMD board before the local enhanced management process got fully under way. This was done to allow any HPA access to the non-regulatory tools recommended by the MAC – these being the Kansas Water Transition Assistance Program (WTAP), the Federal Environmental Quality Incentives Program (EQIP) and the local Northwest Kansas Groundwater Conservation Foundation program.

There was no question that these state and federal tools were going to be used, and in order to use them the specific areas had to be formally closed by order of the chief engineer and had to be designated as areas in need of aquifer restoration. There was every advantage to set the areas early in the process.

2) The board-selected triggers (measured water level declines and 2-mile reported water use density) that ultimately established the HPA boundaries were applied to every section in GMD 4 simultaneously and equally. Only those sections that exceeded either trigger,, and met the rest of the criteria,, were subsequently included in a HPA.

3) The data upon which all board decisions were based was the best data available at the time of the decision, and KGS was consulted a number of times as noted and responded each time.

4) In context with the full effort, the GMD 4 board believes there was a state expectation that aquifer sub-units were to be used, requiring boundaries, and, that the process used by GMD 4 to designate the HPA boundaries was reasonable, therefore the boundaries of HPA SD-6 are reasonable.