Initial Report of the Chief Engineer

Prepared pursuant to K.A.R. 5-4-1

Concerning a Claim of Water Right Impairment

In the Matter of

Vested Right Haskell County No. 3

Owned and operated by

Garetson Brothers

November 7, 2016

David W. Barfield, P.E.
Chief Engineer
Division of Water Resources
Kansas Department of Agriculture

Final Report Of The Fact Finder / Referee

Pertaining To

Case No. 12-CV-9

District Court Of Haskell County

March 27, 2014

Prepared by

Kansas Department of Agriculture

Division of Water Resources

i. Executive Summary

The Kansas Department of Agriculture – Division of Water Resources ("DWR") has been appointed fact finder in Garetson Brothers v. American Warrior Inc. and Koehn, 12-CV-9, in the District Court of Haskell County, Kansas. DWR submitted its preliminary "Report of the Fact Finder" ("First Report") to the Court on April 1, 2013, as ordered by the Court. In that report, DWR found that the water available to Vested Right, No. HS 003 ("File No. HS 003") is reduced by the interaction of five neighboring wells, two of which are presently authorized by water rights owned by American Warrior, Inc. ("AWI") and operated by Rick Koehn, but that DWR did not have all information and data necessary to determine the extent of the impairment to File No. HS 003 caused by operating AWI's neighboring water rights or to recommend a specific remedy for any such impairment. DWR reported that additional work was required to make these findings: a step drawdown test to determine the optimal pumping rate at File No. HS 003, installation of more monitoring equipment in neighboring wells, and analysis of the data gathered from these additional actions including data collected during the 2013 calendar year. See Fact Finder Report, pp. 5-6.

Since its First Report, DWR has collected and analyzed other relevant data including data compiled by the Kansas Geological Survey, conducted a step drawdown test at File No. HS 003, installed needed monitoring equipment, and completed another year of monitoring and data collection. The data, analyses, and findings are presented herein.

Recharge to the groundwater system in the area is estimated to average somewhere in the range of 0.1 inch to 1.0 inch per year. This means that the amount of water replenishing the area of concern is less than 100 acre-feet per year compared with pumping that has been between 1200 and 1500 acre-feet per year in recent history. This has led to substantial declines in groundwater level over the decades, reducing well yields.

Attached to this report is corroborating research by the Kansas Geological Survey ("KGS") which has done extensive and relevant research in the immediate vicinity. The KGS work demonstrates that the rate of water extraction from the aquifer greatly exceeds the rate of recharge to the aquifer such that water levels, measured in the winter months before irrigation begins, have declined about 30 feet; about 6 feet on average each year for the last 5 years. KGS scientists have found that, if recent practices continue, well operators in the area are facing the imminent end of the productive life of the isolated compartment of aquifer that they share.

When an application for a permit to appropriate water is considered, the chief engineer decides, based on the best available data at the time, whether approval of such permit will impair existing water rights. Because water availability conditions in the source of supply may change over time, K.S.A. 82a-706b and 82a-717a provide authority and mechanisms for water administration to prevent junior appropriators from impairing senior water rights and to regulate appropriation rights as may be necessary to secure water to the person having the prior right to its use. Neither a permit to appropriate water nor a certificate of appropriation guarantees that water will always be available to any permit holder.

Though the substantial dewatering of the aquifer has set the stage for the current hydrologic setting, DWR has concluded that impairment to File No. HS 003 is principally caused by direct well-to-well interference from junior appropriators. File No. HS 003 can be satisfied if the other wells in the area are not operating.

Because of their significant hydraulic connection, DWR finds it necessary to include six water right files in this investigation:

- Garetson Brothers' File No. HS 003. This well is completed to bedrock as indicated by the well log graphically portrayed in Figure 2 of the First Report. The bottom several feet of the well are in shale deposits.
- Water Right File, Nos. 10,467 and 25,275 are named in this action and are at times in this report referred to together as ("AWI's Water Rights").
- Water Right File, Nos. 10,035; 11,750; and 19,032 are at times in this report referred to together as the ("Other Neighboring Water Rights"). All six water rights are at times in this report referred to together as the ("Neighborhood").

Each of the Neighborhood water rights authorizes a single well which is operated at a specific location; therefore this report will use the Water Right or Vested Water Right number to refer to either the well system or the water right depending on the context.

Water Right File, No. 8157 authorizes water use from two wells: one, which is the same well authorized under File No. HS 003, and another well about a mile south (south well). DWR observed that the operation of the south well does not affect well File No. HS 003, that is, no significant drawdowns are observed in well File No. HS 003 due to operating the south well. The KGS report referred to above describes the aquifer in this area as "compartmentalized". It appears to DWR that the south well is not in the same compartment as the Neighborhood discussed herein . Also, the owner has not requested relief for Water Right File, No. 8157.

On November 19-21, 2013, DWR conducted a step drawdown test of the well system at File No. HS 003 and found a maximum sustained pumping rate of 404 gallons per minute ("gpm"). Though File No. HS 003 is authorized at a rate of 600

gpm, DWR does not believe that 600 gpm can be sustained in the current hydrologic setting. Protecting the 404 gpm rate would provide the owner of File No. HS 003 the ability to satisfy the full authorized quantity of his vested right within the irrigation season.

DWR observed that even though pumping of AWI's water rights was limited to less than 100 acre-feet prior to May 26, 2013, pre-irrigation season and early irrigation season pumping by the Other Neighboring Water Rights reduced the water level at File No. HS 003 such that File No. HS 003 was not able to pump after July 1, 2013.

As established in the First Report, when all Neighborhood water rights are being operated, AWI's Water Rights account for about half of the impacts at File No. HS 003. And because they are physically closer to File No. HS 003 than the Other Neighboring Water Rights, the impacts to File No. HS 003 from pumping AWI's Water Rights are more immediate. As a result of the additional data collection and analysis, more refined aquifer properties were determined, and the same conclusion on the relative effective of pumping by the area wells was confirmed. See Attachment 5.

In 2013, DWR observed that, even with the very limited pumping by AWI's Water Rights, File No. HS 003 is being significantly, and at times completely, impaired by the Other Neighboring Water Rights. The practical result is that, if File No. HS 003 is to be protected such that it can pump 404 gpm during the irrigation season until its water right is fulfilled, pumping by both AWI's Water Rights and the Other Neighboring Water Rights must be significantly curtailed.

DWR finds that File No. HS 003 has been substantially impaired by operation of the AWI's Water Rights and the Other Neighboring Water Rights.

This report includes an analysis of options to remedy this impairment in the short-term. Though the area has been severely dewatered, DWR finds that with careful regulation of use, there may be sufficient remaining water supply to fulfill File No. HS 003's water right and to provide a limited supply to one other Neighborhood water right.

However, even this limited use cannot be sustained for long.

ii. Procedure, Content, and Nature of this Final Report

In her case management order of November 5, 2013, District Judge Linda Gilmore directed DWR to continue as the court appointed referee in this case; to continue its investigation; to set forth findings of fact in regard to the degree File No. HS 003 is being impaired by Water Rights, File Nos. 10,467 and 25,275; if DWR believes the impairment to be substantial, to recommend remedies to curtail the impairment; and to provide other opinions upon the facts it deems proper in view of the issues raised.

This report is a technical examination of the physical relationships between pumping wells. As was the case with the development of the First Report, the 2013 investigation, analyses, and this Final Report were performed and developed pursuant to Court order in conformance with K.S.A. 82a-725. Because the claim of impairment is being pursued in district court and not through DWR's administrative process, the provisions of K.A.R. 5-4-1 and 5-4-1a were not applied. Additionally, DWR has not produced any type of economic impact analysis pertaining to this matter, as such an analysis was not ordered by the Court and is not otherwise required by law for this proceeding.

Southwest Kansas Groundwater Management District No. 3 (GMD 3) has been aware of the concerns of the owners of File No. HS 003 since at least 2006 when the owners, in a public forum, requested assistance from GMD 3 in dealing with the on-going declines in water levels and water availability in the area. DWR has informed and continues to inform GMD 3 on this impairment complaint and its underlying causes.

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1. Introduction and Background

In March 2005, Garetson Brothers, operator and part owner of Vested Water Right, File No. HS 003 (File No. HS 003) filed a written impairment complaint against the nearest junior water rights File Nos. 10,467 and 25,275 (collectively referred to as "AWI's Water Rights"). By Letter dated February 22, 2007, Garetson Brothers formally withdrew the impairment complaint against Water Right, File Nos. 10,467 and 25,275. Figure 1 depicts the location of File No. HS 003 and area water rights found to have a direct impact on File No. HS 003, indicating the distance of each water right from File No. HS 003.

Figure 1 - Impairment Investigation Site

In 2012 Garetson Brothers filed suit against the then owners and operators of File Nos. 10,467 and 25,275 in Haskell County District Court for impairment of HS 003. In his November, 2012 order, District Judge Bradley E. Ambrosier appointed DWR as a fact finder in the case and directed DWR to submit to the Court a report setting forth the facts concerning the case.

DWR submitted its preliminary fact finder report ("First Report") to the Court as ordered on April 1, 2013. DWR found that File No. HS 003 is being impaired by File Nos. 10,467 and 25,275; but also by three other nearby water rights; File Nos. 10,035; 11,750; and 19,032. DWR quantified the relative impacts of each of these water rights on File No. HS 003. However, because pumping wells in the investigation area had, by the beginning of the irrigation season already lowered water levels to the point where File No. HS 003 was being significantly impacted, DWR was not able to establish a baseline from which to quantify the extent of the impairment in the timeframe given by the Court. DWR stated in its First Report that several actions needed to be taken in order to quantify the extent of impairment.

In November, 2013, District Judge Linda Gilmore, who succeeded Judge Ambrosier on this case, directed DWR to continue as the court appointed referee; to continue its investigations; to make findings of fact in regard to the degree Vested Right HS-003 is being impaired by water rights File Nos. 10,467 and 25,275; if DWR believes the impairment to be substantial, to recommend remedies to curtail the impairment; and to provide other opinions upon the facts DWR deems proper in view of the issues raised.

In addition to the data, analyses, and findings it sets forth, the First Report includes foundational information regarding water rights development and DWR's process to investigate impairment complaints. The First Report is incorporated by reference into this second fact finder report ("Second Report").

1.1. Additional Information on the Hydrologic Setting

Figure 2 is a summary of average groundwater use density in acre-feet per square mile within the Southwest Groundwater Management District No. 3 (GMD 3) based on records submitted to DWR. The star on the map indicates the vicinity of File No. HS 003. The graphic shows that the water use density in the vicinity of File No. HS 003 is among the highest in GMD 3. Water use under the six water rights studied herein ranges between 1200 and 1500 acre-feet per year in recent history.

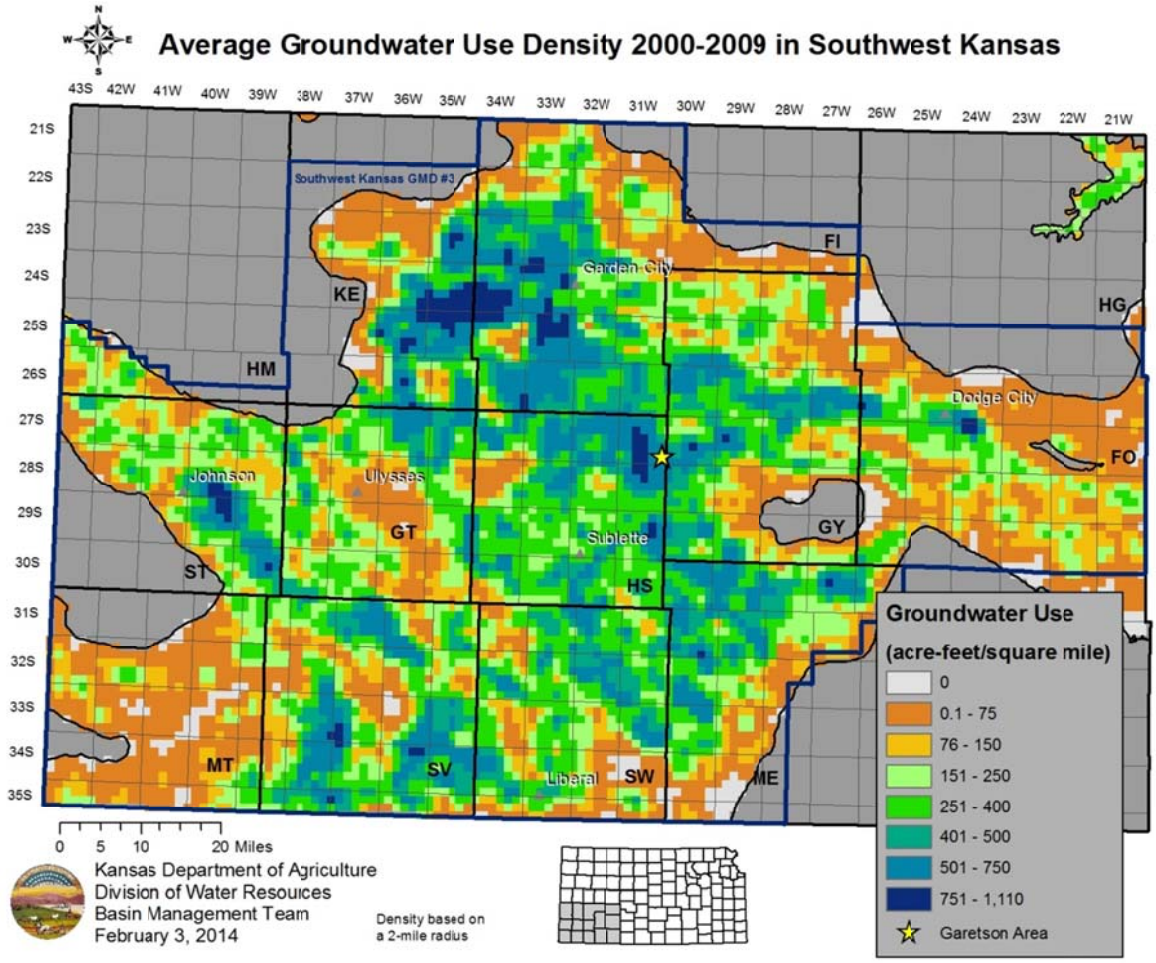


Figure 2 - Average Groundwater Use Density 2000-2009 in Southwest Kansas

Average annual recharge in the area is very limited, estimated to be somewhere between 0.1 inch per year according to the KGS-developed GMD 3 Model to 1.0 inch per year as estimated by the United States Geological Survey[1], translating into a range of 5 to 50 acre-feet of recharge per square mile. At 1.0 inch per year, the average recharge of the area of interest would be less than 100 acre-feet per year.

This imbalance between the rate of extraction and the rate of recharge has led to significant declines in water levels. Figure 3 is a map depicting changes in the thickness of soil deposits saturated with water ("saturated thickness") within GMD 3. The star indicates the vicinity of File No. HS 003 and shows saturated thickness declines exceed 125 feet in the area as measured by January (non-pumping season) water levels.

[1] Water resources investigations report 87-4230, plate no. 4, dated 1987.

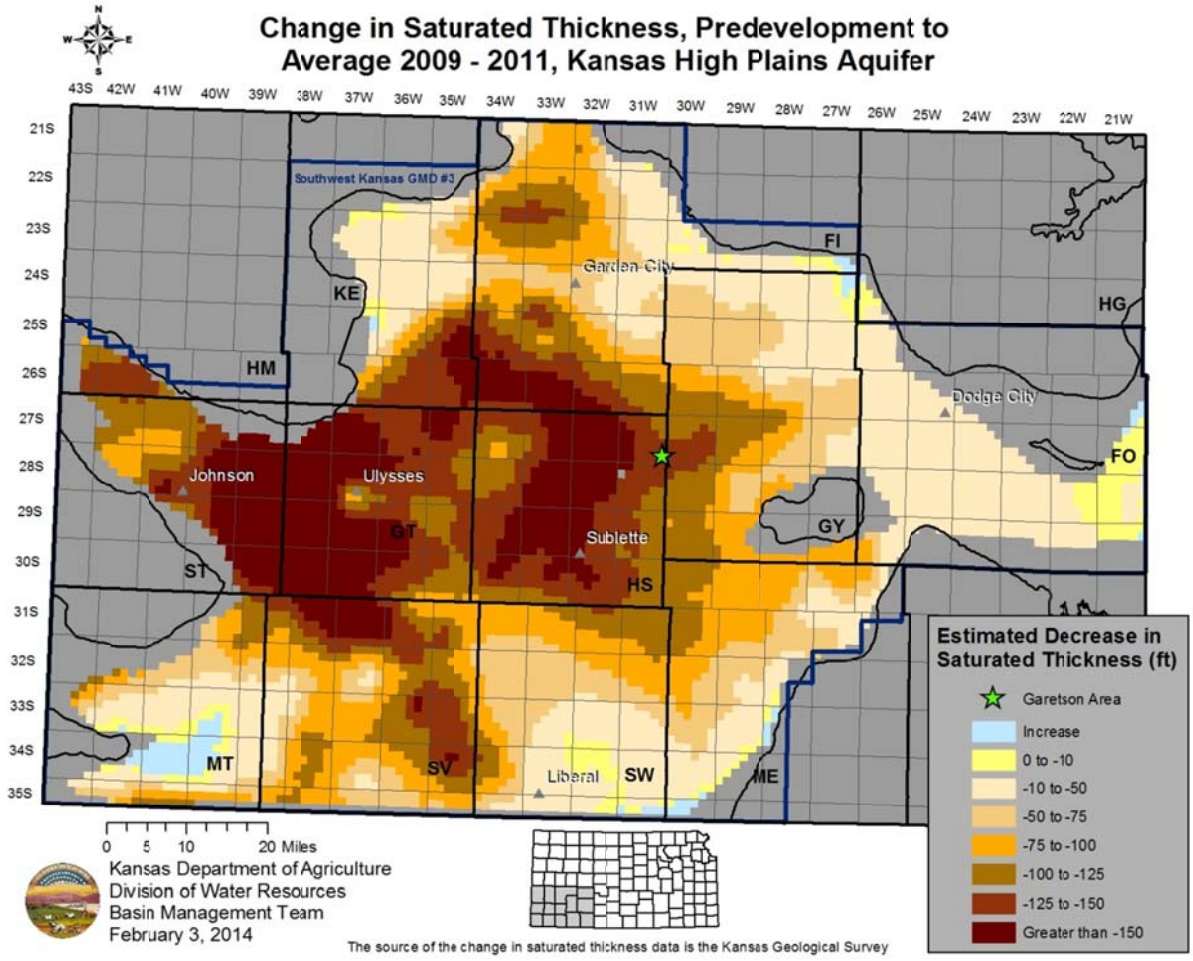


Figure 3 - Interpolated Groundwater Level Changes

Attachment 4 is published work by the Kansas Geological Survey ("KGS") which has done extensive and relevant research in the immediate vicinity. The KGS work demonstrates the rate of water extraction from the aquifer greatly exceeds the rate of recharge to the aquifer such that the beginning water levels have declined about 30 feet; about 6 feet on average each year for the last 5 years. See Figure 4 below. The figure also illustrates the significant annual drawdown experienced in the area due to seasonal irrigation pumping. KGS scientists conclude that, if recent practices continue, well operators in the area are facing the imminent end of the productive life of the isolated compartment of aquifer that they share.

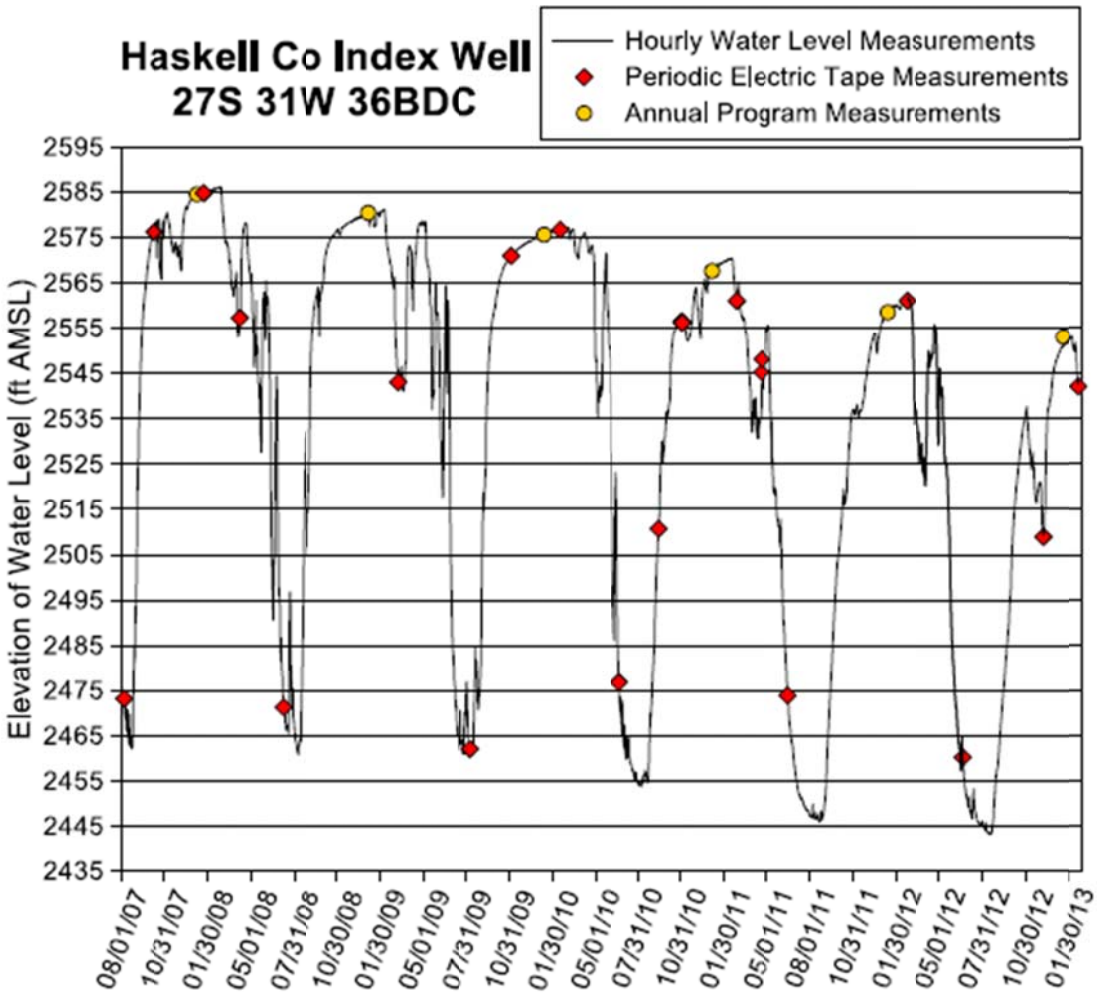


Figure 3: Haskell County index well hydrograph – total data run to 2/19/13. A water-level elevation of 2445 ft corresponds to a depth to water of 392.85 ft below land surface (lsf); the top of the screen is 420 ft below lsf (elevation of 2417.85 ft) and the bottom of the aquifer is 433 ft below lsf (elevation of 2404.85 ft). The screen terminates 3 ft above the bottom of the aquifer.

Figure 4 - Haskell County index well hydrograph (KGS). (*Courtesy of the Kansas Geological Survey*[2])

2. Data Collection and Monitoring in 2013

DWR continued to monitor and analyze pumping times, rates and quantities throughout 2013. File No. 25,275 was not operated in 2013 and File No. 10,467 did not operate after May 26, 2013. Even so, pumping at the Other Neighboring Water Rights caused significant, and at times impairing, levels of drawdown at File No. HS 003. See Figure 5 below.

[2] Graph taken from KGS report included in Attachment 4.

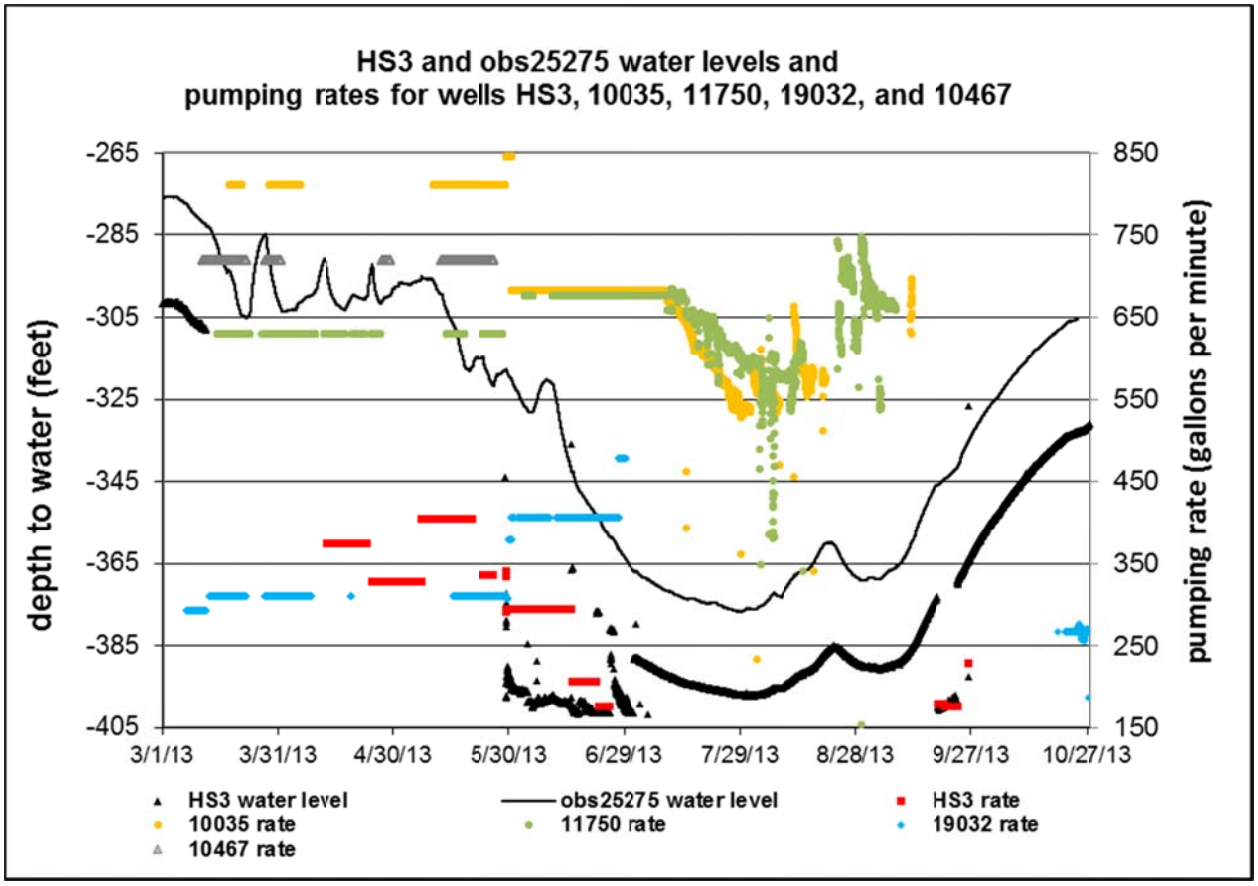


Figure 5 - Pumping time, rates, and water levels for 2013 operations of Neighborhood wells

DWR's First Report discussed critical water levels at pages 20-21. The top of the well screen for File No. HS 003 is at 2456 feet above mean sea level which is 398 feet below land surface. The bold black line in Figure 5 is the depth to water in File No. HS 003 and the normal black line shows the water levels in the nearby observation well. Pumping times and rates at each of the wells are shown in the various colors, with rates indicated on the right vertical "y-" axis.

Due to pre-irrigation season pumping, by May 26 the Neighborhood had pumped about 430 acre-feet and File No. HS 003 could not pump more than about 300 gpm. By the end of June, there was not enough water to operate wells File Nos. HS 003 and 19,032 concurrently.

Drawdown at observation well obs25275 and meter readings, pumping rate, and pumping time data gathered at each of the Neighborhood wells during the first 80 days of irrigation season in 2013 were analyzed with AQTESOLV aquifer test analysis software to obtain areal aquifer parameters: transmissivity = 21,279 gallons per day per foot (2,844.8 ft^2/d) and storativity = 0.0003812. See Attachment 1. These aquifer parameters were then utilized in the Theis equation to analyze and

simulate the drawdown at File No. HS 003 caused by pumping at the other Neighborhood wells.

The aquifer test results presented in the First Report were based on individual well-to-well tests of shorter duration of a few days each in 2007 while the 2013 results presented in this report are based on a longer-term aquifer test of Neighborhood wells which provides a better estimation of the aquifer properties. The 2013 aquifer test provides a single set of parameters for analysis of Neighborhood water rights. DWR found that the relative contributions to drawdown at File No. HS 003 caused by pumping at each of the Other Neighboring Water Rights are not significantly different than what is presented in the First Report. See the comparison of the 2007 and 2013 calculations in Attachment 5.

2.1. Step Drawdown Test at File No. HS 003

DWR performed a step drawdown test on the well at File No. HS 003 November 19-21. In order to determine the optimal pumping rate of the well at that time, the test was conducted late in the year to allow water levels to recover as much as possible and before weather conditions might prevent the test from being performed. Only one of the area wells was operating at the time of the test. Pumping at File No. 19,032; observed at about 230 gpm during the test period, appeared to slightly slow the recovery of the water level at File No. HS 003 leading up to the test period. File No. 19,032 began a period of fall pumping on November 1 and continued to pump through the duration of the step drawdown test. Water levels were observed for the period 48 hours before the step drawdown test was performed and it appeared that pumping by File No. 19,032 was diminishing the rate of aquifer recovery such that water levels were increasing at about 0.5 feet per day. Because of this relatively small change in daily water levels, DWR determined that pumping by File No. 19,032 did not significantly impact the step drawdown test and further that such pumping by File No. 19,032 may have simplified the step drawdown test somewhat since no correction factor had to be applied to the test to account for the change in water level caused by the recovering aquifer.

The step drawdown test consisted of observing the operation of File No. HS 003 as it was pumped at increasing rates in order to determine the maximum rate that the well system could sustain. The steps tested were (in gpm): 230, 295, 380, and 414. For the last step (414 gpm), the power applied to the pump was held constant as much as practical while the actual pumping rate and depth to water in the pumping well were observed for approximately 36 hours. DWR observed that over the last 14 hours, the pumping rate stabilized at 404 gpm while the depth to water in the pumping well stabilized at 398 feet. See Figure 6.

Based on the observations from this test, DWR finds that the maximum sustained rate available at File No. HS 003 is 404 gpm. Had the aquifer been allowed more time to recover, that is; had the Neighborhood wells been inactive for a longer period of time before the test was conducted, it is reasonable to infer that that the maximum sustained rate available at File No. HS 003 may have been found to be somewhat higher.

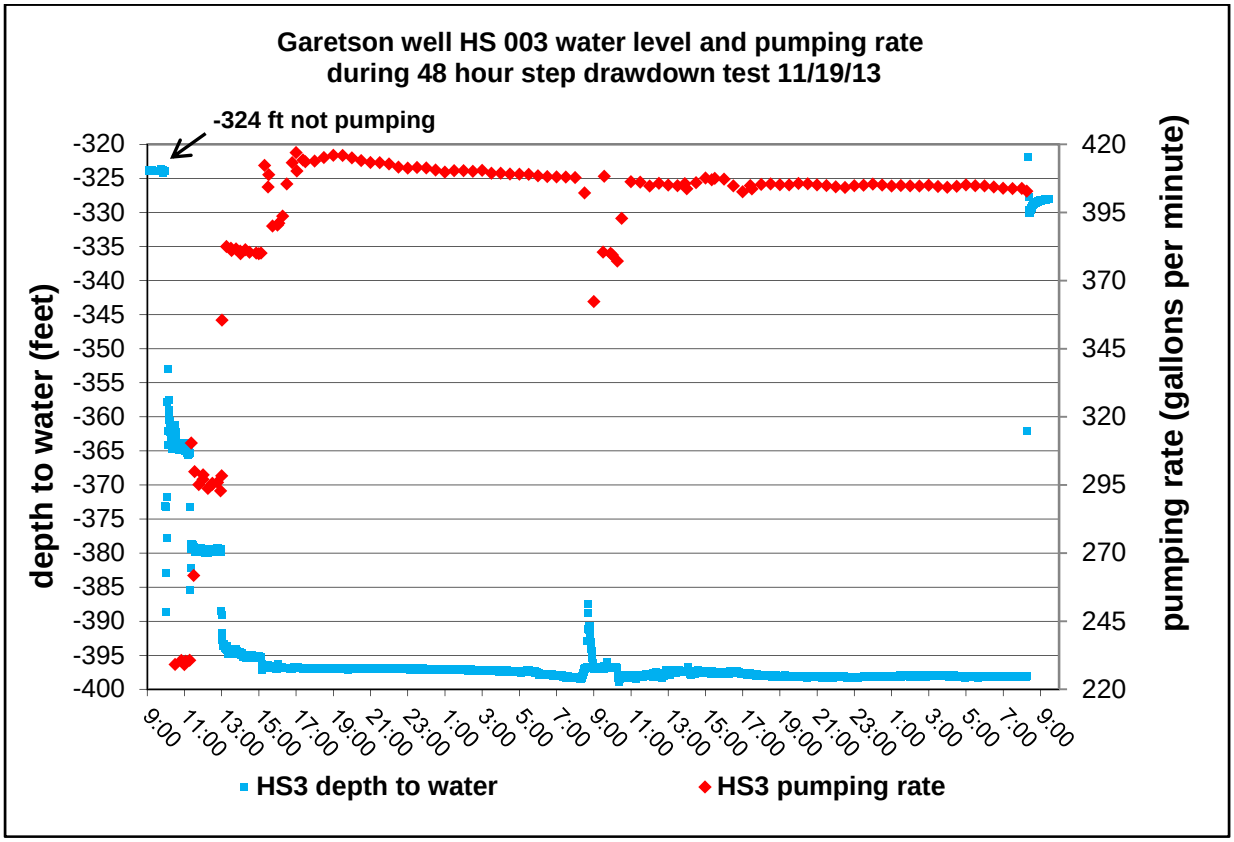


Figure 6 - Results of step drawdown test performed at HS 003

3. Quantification of Impairment to HS 003

File No. HS 003 is authorized to pump 240 acre-feet at a rate of 600 gpm for the irrigation of crops. Based on the results of the step drawdown test, DWR finds that File No. HS 003 is being impaired when the operations of any of the other Neighborhood wells, including AWI's Water Rights, the Other Neighboring Water Rights, or any combination thereof prevents File No. HS 003 from pumping 240 acre-feet at 404 gpm during the irrigation season.

4. Analysis and Observations

4.1. Pre-season water level and available water

The highest water levels measured at observation well obs25275 prior to irrigation seasons 2010, 2011, 2012, and 2013 were depths to water of 252.1 feet, 258.7 feet, 267.1 feet, and 275.6 feet, respectively. This translates to drops of 6.7 feet, 8.4 feet, and 8.5 feet over the 3-year period, for a total of 23.6 feet.

The total amounts of water pumped from Neighborhood wells in 2009, 2010, 2011, and 2012 were about 1,000 acre-feet, 1,174 acre-feet, 1,394 acre-feet, and 1,312 acre-feet respectively. DWR observed a strong linear relationship between the cumulative total volumes of water pumped by Neighborhood wells each year and the highest pre-season water level at the observation well obs25275 the following year over 2009-2012. See Figure 7.

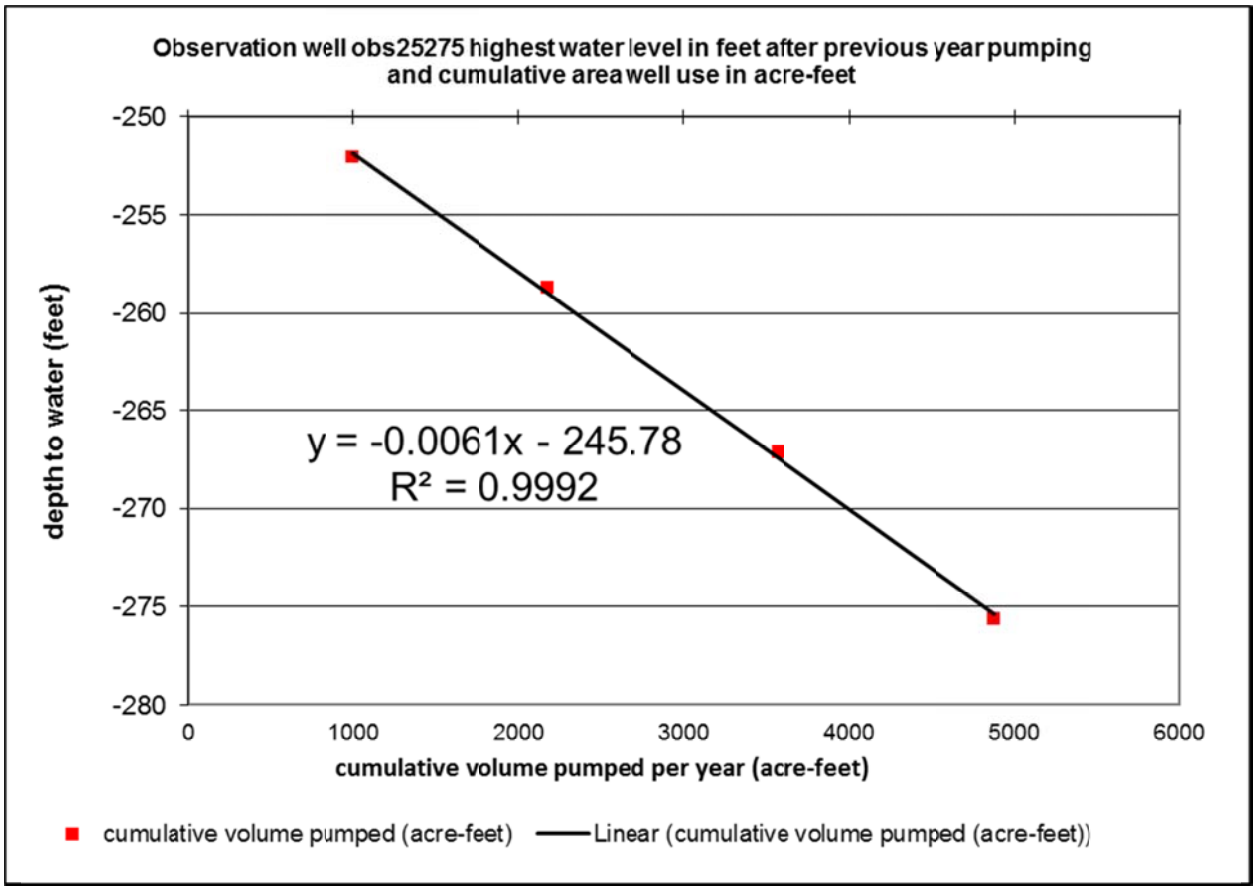


Figure 7 - Linear relationship between water pumped and pre-season water level the following year.

Based on the amount of water pumped from the area wells in 2013 and the linear relationship to the pre-season water level the following year, a pre-season depth to water of about 305 feet is forecast for File No. HS 003 in 2014. This assumption is used as the starting point for the analyses below.

The ability of File No. HS 003 to pump 240 acre-feet at 404 gpm depends in large part on the water level at the beginning of the irrigation season. Each year the pre-season water level will decline from the 305 feet referred to above, and this will reduce the amount of water the other Neighborhood wells can pump before they will impair File No. HS 003.

With an assumed pre-season depth to water of 305 feet at File No. HS 003, 93 feet of drawdown to the top of the well screen at File No. HS 003 is available. See Figure 8. As observed in the step drawdown test there must be at least 74 feet of water above the top of the well screen prior to pumping to maintain a pumping rate of 404 gpm for the authorized 240 acre-feet. The difference between the drawdown at HS 003 caused by its own operation and the top the well screen at File No. HS 003 is an indication of water that could be pumped by other wells. However, as discussed below, the amount of additional water is quite limited, and can only be accessed without impairing File No. HS 003 by closely following prescribed pumping operations.

Furthermore, even if one or more other wells is operated to access that portion of the water supply that does not impair File No. HS 003, if the pre-pumping water levels continue the decline of recent years, there will, in the near future, no longer be water available for another well to pump without impairing File No. HS 003's ability to access its water supply. Any remedy that aims to protect the longer-term viability of File No. HS 003 will necessarily involve a reduction to the overall quantity of water pumped in the Neighborhood to substantially reduce the dramatic declines in water levels.

4.2. Projected water available in 2014 for other wells if File No. HS 003 is protected at 404 gallons per minute for 240 acre-feet

Using the results from the step-drawdown test, AQTESOLV was used to estimate the drawdown in File No. HS 003 due to pumping, including well loss, using a Theis solution that involved solving for transmissivity (T) and a parameter that can be used as storage coefficient (S). This S parameter does not represent the storage coefficient of the aquifer; but considers aquifer properties and the effect of well loss in the pumping well. Thus parameters T = 2635 ft^2/day and S = 2E-10 or 0.0000000002 were computed by the Theis type curve matching of the observed drawdowns at well File No. HS 003 caused by pumping well File No. HS 003 during the second day of the step drawdown test for this limited purpose. These parameter values are not to be used to compute drawdown at any other well or caused by another well pumping.

The quantity of water authorized by File No. HS 003 is 240 acre-feet, which at 404 gpm takes about 134 days to pump. Assuming the pre-season depth to water

at File No. HS 003 is 305 feet, the initial available drawdown to the top of the well screen, which is at 398 feet, would be 93 feet. At the end of each 30-day pumping period, simulated drawdowns are: 80.9 feet at the end of the first 30 days; 82.5 feet at the end of 60 days; 83.5 feet at the end of 90 days; and 84.1 feet at the end of 120 days of pumping. At 134 days the simulated drawdown at File No. HS 003 due to its own pumping is about 84.4 feet. When File No. HS 003 pumps 404 gpm it appears that there would still be some water available for another well or wells. The area below the curve and above the horizontal "x-" axis in Figure 8 below shows the simulated amount of drawdown at File No. HS 003 that other wells could cause without immediately impairing File No. HS 003.

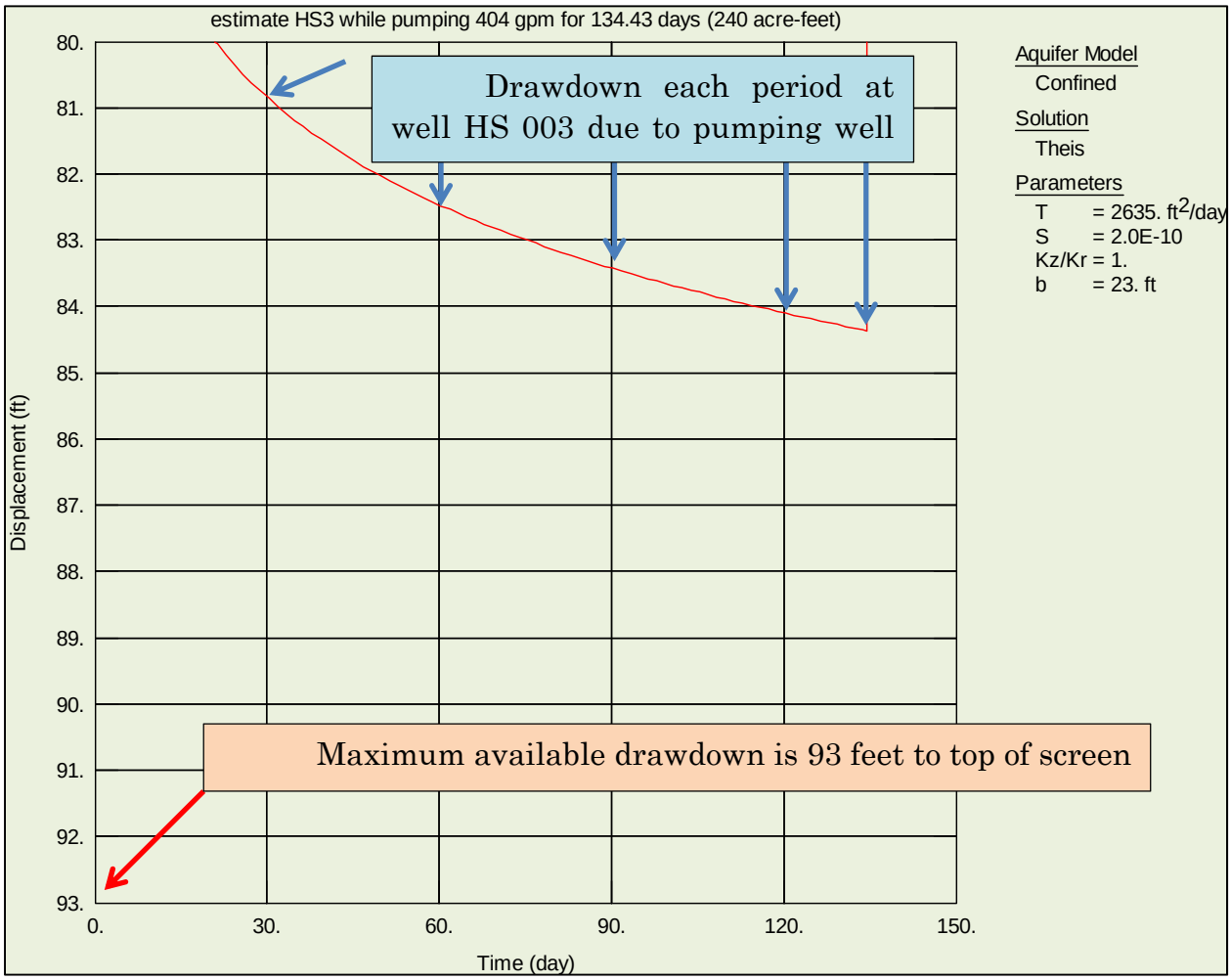


Figure 8 - Simulated drawdown in 2014 at irrigation well File No. HS 003 due to pumping well File No. HS 003 at 404 gpm leaves some drawdown available for other wells to the top of the File No. HS 003 well screen at 93 feet when the pre-pumping depth to water is 305 feet. Available drawdown for other wells is the difference between 93 feet and File No. HS 003 drawdown.

Table 1 below shows, in 30-day periods, the simulated amount of drawdown that could be caused by operating other wells without immediately impairing File No. HS 003.

30 day period	Pre-season available drawdown	Simulated drawdown at File No. HS 003 pumping 404 gpm	Drawdown without impairing File No. HS 003
0-30 days	93 feet	80.9 feet	12.1 feet available
30-60 days	93 feet	82.5 feet	10.5 feet available
60-90 days	93 feet	83.5 feet	9.5 feet available
90-120 days	93 feet	84.1 feet	8.9 feet available
120-134 days	93 feet	84.6 feet	8.4 feet available

Table 1 - Simulated available drawdown in 2014 at the end of each 30 day period pumping well File No. HS 003 404 gpm

4.3. Simulation of available pumping in 2014 at one well when well File No. HS 003 is pumping 404 gallons per minute

Drawdown at File No. HS 003 due to pumping at File No. 10,035 was simulated using AQTESOLV. Because it is farthest from well File No. HS 003, pumping at File No. 10,035 causes the least amount of drawdown at File No. HS 003 and represents a least-impact scenario when compared to drawdowns at File No. HS 003 caused by pumping any of the other Neighborhood wells. Maximum pumping rates available at File No. 10,035 for 30-day periods were simulated such that drawdown would not immediately impair File No. HS 003. The available drawdown for each 30-day period is shown in Figure 8 above and in the far right column of Table 1 above. Table 2 below and the graphic in Figure 9 both illustrate the drawdown at File No. HS 003 caused by pumping the farthest well at the rates and quantities simulated.

30 day period	Simulated drawdown at File No. HS 003 by pumping at File No. 10,035 (feet)	Simulated Pumping Rate at File No. 10,035 (gpm)	Simulated volume pumped by File No. 10,035 (acre-feet)	Cumulative simulated volume pumped by File No. 10,035 (acre-feet)
0-30 days	12.1	645	86	86
30-60 days	10.5	430	57	143
60-90 days	9.5	345	46	188
90-120 days	8.9	300	40	228
120-134 days	8.4	270	17	245

Table 2 - Simulated gallons per minute (gpm) and acre-feet pumped in 2014 from the farthest irrigation well from File No. HS 003 (pumping available drawdown assuming no other irrigation wells are pumping with the pre-season water level assumed to be 305 feet depth to water and available water is to the top of File No. HS 003 well screen.

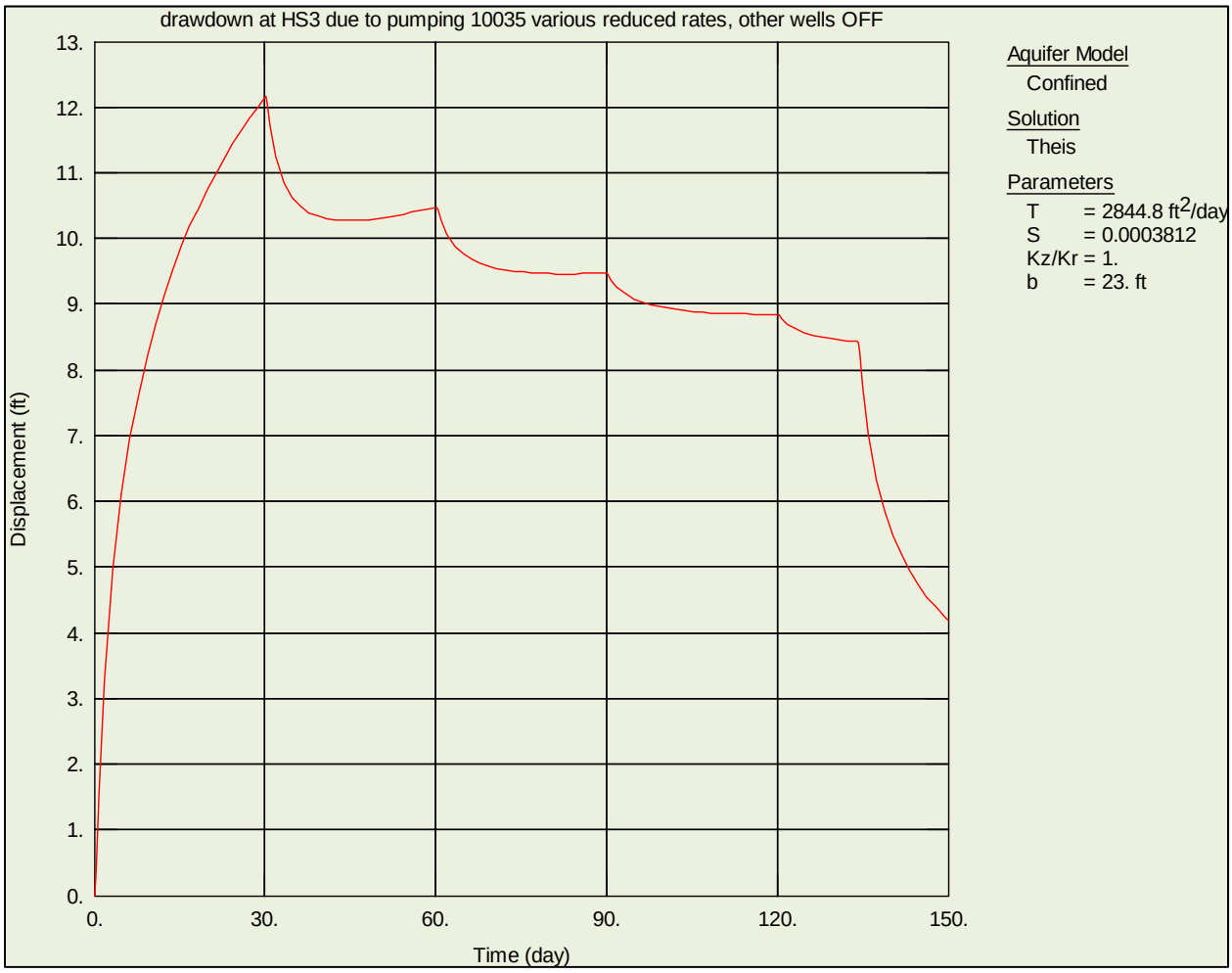


Figure 9 - Simulated drawdown at irrigation well File No. HS 003 in 2014 due to pumping the farthest well from File No. HS 003 at the highest pumping rate for each 30 day period so as not to interfere with well File No. HS 003 pumping 404 gpm. All of the available drawdown is utilized by pumping the farthest well from File No. HS 003 and no other irrigation wells are pumping.

The above analysis for 2014 for File No. 10,035 was performed for each of the other Neighborhood wells assuming in each case, only one well was pumping in addition to File No. HS 003. Table 3 below shows the results of the same analysis, ordered by their distances from File No. HS 003 (second column). Each row in Table 3 shows simulated 2014 pumping rates and total quantity for only that well pumping while File No. HS 003 pumps 404 gpm.

	Distance from well HS3 (feet)	Authorized Rate (gpm)	0-30 days Simulated Rate (gpm)	30-60 days Simulated Rate (gpm)	60-90 days Simulated Rate (gpm)	90-120 days Simulated Rate (gpm)	120-134 days Simulated Rate (gpm)	Simulated acre-feet pumped
10467	1427	1000	410	300	250	225	205	170
25275	1635	1200	430	315	260	205	0	160
19032	3422	930	600	410	330	290	0	216
11750	3865	1650	640	430	345	300	265	244
10035	3935	1195	645	430	345	300	270	245
HS3	at well	601	404	404	404	404	404	240

Table 3 - Simulated maximum gallons per minute (gpm) and acre-feet pumped in 2014 by only one of the Neighborhood wells while well File No. HS 003 is able to pump 404 gpm.

4.4. Projection of available water in the near future with one other well pumping

As is demonstrated above, with a starting depth to water of 305 feet, there is enough water for File No. HS 003 to pump 404 gpm for 240 acre-feet, and enough for the most distant Neighborhood well File No. 10,035 to pump concurrently according to the time and rate schedule set forth in Table 2 without impairing File No. HS 003. However, under this scenario, no other Neighborhood wells could be operated without impairing File No. HS 003. In the simulation, the total quantity of water pumped from the area was 485 acre-feet.

According to the linear relationship between water pumped and water levels discussed above, if a total of 485 acre-feet is pumped in 2014 from File No. HS 003 and File No. 10,035; next year's 2015 pre-season depth to water at well File No. HS 003 is expected to be about 308 feet, or 3 feet lower than in 2013. For well File No. HS 003 to continue to pump 404 gpm in 2015; File No. 10,035 would have to further reduce pumping rates because there will be less available drawdown at well File No. HS 003. Table 4 below shows the simulated gallons per minute and acre-feet pumped beginning in 2014 and continuing for the next three years with only File No. 10,035 pumping such that File No. HS 003 is able to pump 240 acre-feet at 404 gpm. Table 5 shows the simulated drawdown at File No. HS 003 caused by pumping File No. 10,035 and the pre-season water level at File No. HS 003.

Simulated gallons per minute (gpm) and acre-feet pumping all available water by farthest well File No. 10,035						
Year	0-30 days gpm/ acre-ft	30-60 days gpm / acre-ft	60-90 days gpm / acre-ft	90-120 days gpm / acre-ft	120-134 days gpm / acre-ft	Totals acre-ft
2014	645 / 86	430 / 57	345 / 46	300 / 40	270 / 17	245
2015	485 / 64	305 / 40	230 / 30	195 / 26	160 / 10	171
2016	350 / 46	195 / 26	135 / 18	100 / 13	70 / 4	108
2017	240 / 32	105 / 14	50 / 7	20 /3	5 / 0	55

Table 4 – Simulated maximum gallons per minute (gpm) and acre-feet pumped for 2014 – 2017 by most distant well File No. 10,035 while well File No. HS 003 is able to pump 404 gpm.

Simulated drawdown at well File No. HS 003 due to pumping well File No. 10,035 and pre-season water level each year						
	0-30 days drawdown	30-60 days drawdown	60-90 days drawdown	90-120 days drawdown	120-134 days drawdown	Pre-season Water level
2014	12.1 feet	10.5 feet	9.5 feet	8.9 feet	8.4 feet	305.7 ft
2015	9.1 feet	7.5 feet	6.5 feet	5.9 feet	5.4 feet	308.7 ft
2016	6.6 feet	5 feet	4 feet	3.4 feet	2.9 feet	311.2 ft
2017	4.5 feet	2.9 feet	1.9 feet	1.3 feet	1.8 feet	313.3 ft

Table 5 - Simulated drawdown at well File No. HS 003 for 2014 – 2017 due to most distant well File No. 10,035 pumping all available water while well File No. HS 003 is pumping 404 gpm and pre-season water level estimate.

According to these simulations with File No. 10,035 pumping as in Table 4 causing drawdowns at well File No. HS 003 as in Table 5, each succeeding pre-season water level will be deeper, and consequently less water will be available, than if only File No. HS 003 pumped in those years. Beginning in 2018, if no other Neighborhood wells were operated, File No. HS 003 could likely continue to pump 404 gpm until about 2025 when the pre-season water level becomes deeper than 324 feet to water. The results of the simulation are tabulated in Attachment 2.

4.5. Longer-term projections with only File No. HS 003 pumping

The simulation presented in Attachment 3 shows that if, beginning in 2014, none of the other Neighborhood wells were operated, File No. HS 003 could pump 404 gpm for 240 acre-feet per year until 2028 when the pre-season water level becomes deeper than 324 feet to water at which point File No. HS 003 could no longer achieve 404 gpm.

5. Conclusions and remedies

Despite a combined pumping of 98 acre-feet by 25,275 and 10,467 in 2013 (compared to 521 acre-feet pumped in 2012), the senior vested water right File No. HS 003 could only pump 104 acre-feet of water in 2013 due largely to the lowering of the water level at File No. HS 003 caused by other Neighborhood wells pumping during the pre-irrigation season and early irrigation season.

The step drawdown test resulted an observed maximum sustained pumping rate of 404 gpm for File No. HS 003.

Analysis of yearly Neighborhood pumping extractions and subsequent years' water levels shows a strong linear relationship between the two (Figure 7) and the steep negative slope of the regressed line indicates that recent levels of pumping cannot be sustained even into the short-term future. Simulations combining the operation of File No. HS 003 and each of the other Neighborhood wells, one at a time, indicate that only one other well can be allowed to irrigate crops concurrently with File No. HS 003, and then only under a strict time and rate schedule that may prove impractical to implement. Even then, operating another well concurrently with File No. HS 003 shortens the remaining time that there will be water for well File No. HS 003 to pump 240 acre-feet at 404 gpm.

DWR finds that Vested Right HS-003 has been substantially impaired by operation of AWI's Water Rights 10,467 and 25,275; and the Other Neighboring Water Rights: File Nos. 10,035; 11,750; and 19,032.

5.1. Potential remedies

Though the Court directed DWR to determine potential remedies based on administering only AWI's Water Rights, in light of 2013 operations, DWR finds that a remedy that will protect the viability of File No. HS 003 must involve all five of the other Neighborhood water rights. It appears the following options are available:

1. Protect File No. HS 003 to pump 240 acre-feet at 404 gpm by allowing only one of the Other Neighboring Water Rights to be operated.
    a. Rotate which of the other water rights is allowed to operate by year according to:
        i. Seniority of water right (most senior right operates the first year and so on) or
        ii. By distance from File No. HS 003 (most distant right operates the first year and so on)
    b. The other water right would be restricted to the pumping rates and schedule prescribed each year by the methodology presented in Section

4.2 of this report or some alternative that can be demonstrated to prevent impairment of File No. File No. HS 003.

c. Consequences: This remedy, or some close variant, may ease the short-term economic impact of protecting File No. HS 003 but it maximizes yearly use and consequently reduces the productive life of the aquifer for the entire Neighborhood.

2. Protect and prolong File No. HS 003's ability to pump 240 acre-feet at 404 gpm by curtailing all of the Other Neighborhood Water Rights.
   a. Consequences: This remedy has the greatest short-term economic impact to the Neighborhood, but provides maximum protection for the vested water right. Without interference and the additional draw on the aquifer caused by pumping the Other Neighboring Water Rights, File No. HS 003 could be viable for several decades.

6. Attachments:

Attachment 1 – Analysis and results of water level change at observation well obs25275 due to wells File Nos. HS 003, 10,035, 10,467, 11,750 and 19,032 pumping from March 7 to May 26, 2013.

Attachment 2 – Estimated pre-season depths to water with actual area well pumping 2009, 2010, 2011, 2012, 2013 and simulating only well File No. HS 003 and the farthest well File No. 10,035 pumping limited water for years 2014, 2015, 2016, 2017 then only well File No. pumping 404 gpm until 2025.

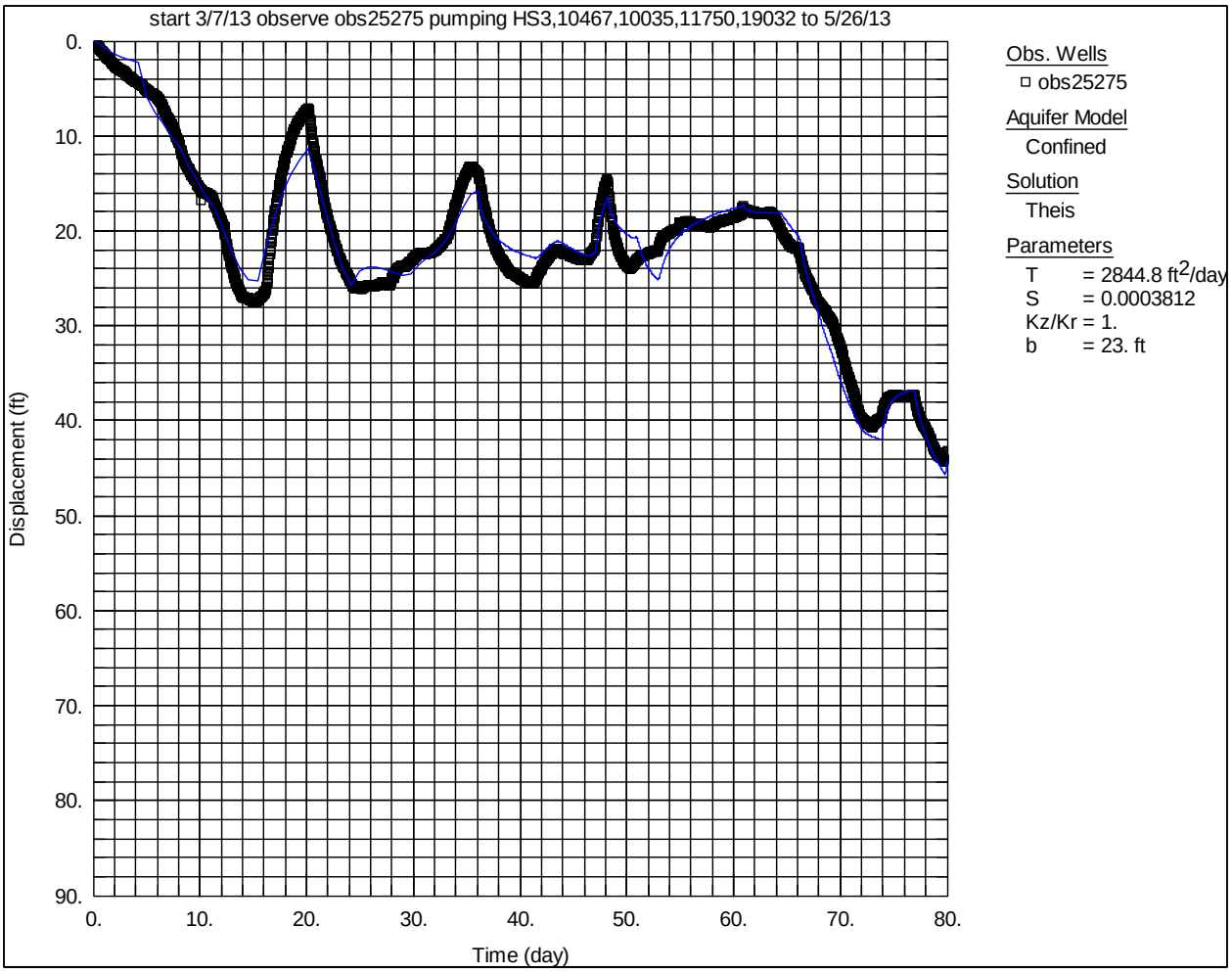
Attachment 3 – Estimated pre-season depths to water only well File No. HS 003 pumping 240 acre-feet per year at 404 gpm until pre-season water level is deeper than 324 feet in 2028.

Attachment 4 –

- High Plains Aquifer Index Well Program: 2012 Annual Report, Kansas Geological Survey, Figure 3. p. 8.
- Butler et al, Interpretation of Water-Level changes in the High Plains Aquifer in Western Kansas, Published in Groundwater v. 51, no. 2, pp. 180-190, 2013

Attachment 5 – Relative impacts to File No. HS 003 caused by pumping other Neighborhood wells based on aquifer parameters determined in 2007 and 2013.

Attachment 1 – Analysis and results of water level change at observation well obs25275 due to wells File Nos. HS 003, 10,035, 10,467, 11,750 and 19,032 pumping from March 7 to May 26, 2013. (Transmissivity 21,279 gpd/ft (2,844.8 ft²/d), Storativity 0.0003812)



Attachment 2 – Estimated pre-season depths to water with actual area well pumping 2009, 2010, 2011, 2012, 2013 and simulating only well File No. HS 003 and the farthest well File No. 10,035 pumping limited water for years 2014, 2015, 2016, 2017 then only well File No. HS 003 pumping 404 gpm until 2025.

year	total water pumped per year acre-ft	cumulative water pumped acre-ft	year	pre-season depth to water estimated (feet) observation well obs25275	irrigation well HS3
2009	1000.684	1000.684	2010	-251.88	-275.88
2010	1174.123	2174.807	2011	-259.05	-283.05
2011	1394.738	3569.545	2012	-267.55	-291.55
2012	1312.948	4882.493	2013	-275.56	-299.56
2013	1014.474	5896.967	2014	-281.75	-305.75
2014	485.000	6381.967	2015	-284.71	-308.71
2015	411.000	6792.967	2016	-287.22	-311.22
2016	348.000	7140.967	2017	-289.34	-313.34
2017	295.000	7435.967	2018	-291.14	-315.14
2018	240.000	7675.967	2019	-292.60	-316.60
2019	240.000	7915.967	2020	-294.07	-318.07
2020	240.000	8155.967	2021	-295.53	-319.53
2021	240.000	8395.967	2022	-297.00	-321.00
2022	240.000	8635.967	2023	-298.46	-322.46
2023	240.000	8875.967	2024	-299.92	-323.92
2024	240.000	9115.967	2025	-301.39	-325.39

Attachment 3 – Estimated pre-season depths to water; only well File No. HS 003 pumping 240 acre-feet per year at 404 gpm until pre-season water level is deeper than 324 feet in 2028 .

year	total water pumped per year acre-ft	cumulative water pumped acre-ft	year	pre-season depth to water estimated (feet) observation well obs25275	irrigation well HS3
2009	1000.684	1000.684	2010	-251.88	-275.88
2010	1174.123	2174.807	2011	-259.05	-283.05
2011	1394.738	3569.545	2012	-267.55	-291.55
2012	1312.948	4882.493	2013	-275.56	-299.56
2013	1014.474	5896.967	2014	-281.75	-305.75
2014	240.000	6136.967	2015	-283.22	-307.22
2015	240.000	6376.967	2016	-284.68	-308.68
2016	240.000	6616.967	2017	-286.14	-310.14
2017	240.000	6856.967	2018	-287.61	-311.61
2018	240.000	7096.967	2019	-289.07	-313.07
2019	240.000	7336.967	2020	-290.54	-314.54
2020	240.000	7576.967	2021	-292.00	-316.00
2021	240.000	7816.967	2022	-293.46	-317.46
2022	240.000	8056.967	2023	-294.93	-318.93
2023	240.000	8296.967	2024	-296.39	-320.39
2024	240.000	8536.967	2025	-297.86	-321.86
2025	240.000	8776.967	2026	-299.32	-323.32
2026	240.000	9016.967	2027	-300.78	-324.78
2027	240.000	9256.967	2028	-302.25	-326.25

Attachment 4 – KGS Open File Report on HSCO Index Well and article in Groundwater

http://www.kgs.ku.edu/Hydro/Publications/2013/OFR13_1/OFR2013-1.pdf

Attachment 5 – Relative impacts to File No. HS 003 caused by pumping other Neighborhood wells based on aquifer parameters determined in 2007 and 2013

	Distance from well HS3 (feet)	Direction	Authorized Rate (gpm)	Simulated Rate (gpm)	Simulated Pumping days	Transmissivity (gpd/ft)	Storativity	Drawdown at well HS3 (feet)	Percent of total drawdown (percent)
10467	1427	east	1000	750	100	46119	0.0002602	14.7	15%
25275	1635	west	1200	362	100	30704	0.0001345	10.6	11%
19032	3422	northeast	930	489	100	46119	0.0002602	7.4	8%
11750	3865	southeast	1650	750	100	88937	0.0002565	6.3	7%
10035	3935	east	1195	713	100	46119	0.0002602	10.3	10%
HS3	at well	at well	601	543	100	28995	0.0003006	46.7	49%
							total	96	100%

Table A1 – Relative impacts to File No. HS 003 caused by pumping other Neighborhood wells calculated using transmissivity and storativity parameters from analysis of 2007 data. This table was included in DWR's First Report.

	Distance from well HS3 (feet)	Direction	Authorized Rate (gpm)	Simulated Rate (gpm)	Simulated Pumping days	Transmissivity (gpd/ft)	Storativity	Drawdown at well HS3 (feet)	Percent of total drawdown (percent)
10467	1427	east	1000	750	100	21279	0.0003812	27.1	16%
25275	1635	west	1200	362	100	21279	0.0003812	12.6	7%
19032	3422	northeast	930	489	100	21279	0.0003812	13.1	7%
11750	3865	southeast	1650	750	100	21279	0.0003812	19.1	11%
10035	3935	east	1195	713	100	21279	0.0003812	18.0	10%
HS3	at well	at well	601	404	100	19710	2.00E-10	85.0	49%
							total	174.9	100%

Table A2 – Relative impacts to File No. HS 003 caused by pumping other Neighborhood wells calculated using transmissivity and storativity parameters from analysis of 2013 data. Note that this table represents the simulated drawdown of each well on File No. HS 003. The total drawdown in the last row is not possible because there is only 93 feet of drawdown available at the beginning of the season. Adding the drawdowns together illustrates that there is not enough water for these wells to operate concurrently in this manner.

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Dale A. Rodman, Secretary

Sam Brownback, Governor

April 1, 2013

Honorable Bradley E. Ambrosier
1025 Morton Ave
Elkhart, KS 67950
Fax: 620-697-4289

RE: 12-CV-9, Haskell County District Court, Fact Finder Report.

Dear Judge Ambrosier:

Please find enclosed the color copy of the Kansas Department of Agriculture, Division of Water Resources, Fact Finder Report submitted for case 12-CV-9 in Haskell County Kansas. If you would like an electronic copy of this report, please let me know. I will note that there are color-coded graphs and charts as part of the report which will not be seen in color in the fax-filed version.

Sincerely,

Matthew A. Spurgin
Staff Attorney
Kansas Department of Agriculture
109 SW 9th, 4th Floor
Topeka, KS 66612
matthew.spurgin@kda.ks.gov

cc: Tim Barker, Jeff Mason (by e-mail)
Toni Martin, Clerk of the District Court, Haskell County Courthouse, PO Box 146, Sublette, KS 67877

IN THE DISTRICT COURT OF HASKELL COUNTY, KANSAS

GARETSON BROTHERS, Plaintiff	)	
	)	12-CV-9
vs.	)	
KELLY AND DIANA UNRUH, Defendants,	)	

FACT FINDER REPORT

COMES NOW, the Kansas Department of Agriculture, Division of Water Resources, and submits its fact finder report, in the above captioned matter, marked as Attachment A and hereby incorporated by reference.

Respectfully Submitted,

Matthew A. Spurgin, S.Ct. #20470
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Certificate of Service

I hereby certify that on this 1st day of April, 2013, a true and accurate copy of the foregoing Fact Finder Report was sent postage prepaid, first class, U.S. mail, to the following:

Timothy C. Barker
Barker Law Office, LLP
307 S. Main Street
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(with copy by e-mail)

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Original to:
Toni Martin
Clerk of the District Court
Haskell County Courthouse
PO Box 146
Sublette, KS 67877

Chamber Copy:
Honorable Bradley Ambrosier
1025 Morton Ave
Elkhart, KS 67950

Leslie Garner
Kansas Department of Agriculture
Staff Person

ATTACHMENT "A"

REPORT OF THE FACT FINDER

PERTAINING TO

CASE NO. 12-CV-9

DISTRICT COURT OF HASKELL COUNTY

APRIL 1, 2013

PREPARED BY

KANSAS DEPARTMENT OF AGRICULTURE

DIVISION OF WATER RESOURCES

Table of Contents

Executive Summary

In their petition to the Court, plaintiffs, hereinafter Garetson Brothers, allege that their Vested Water Right, File No. HS-003, (HS-003), has been impaired, or is about to be impaired by the operation of two nearby wells which are authorized by appropriation rights and are therefore junior. The Kansas Department of Agriculture, Division of Water Resources, (DWR), began an impairment investigation following a 2005 complaint lodged with DWR pursuant to K.S.A. 82a-706b by Garetson Brothers. Garetson Brothers subsequently withdrew their complaint in 2007 before DWR had completed the investigation. DWR took no action but continued to collect data from the investigation site. In 2012 Garetson Bothers filed the current suit in Haskell County District Court. This report is submitted pursuant to the District Court's order appointing DWR as "Fact Finder" in this matter. DWR submits this technical report based upon the available data, noting that further testing, data and analysis would be needed before DWR would find a level of impairment by one or more junior water rights based upon DWR procedures for investigating impairment claims.

In Kansas, there are two types of water rights pursuant to the Kansas Water Appropriation Act, K.S.A. 82a-701 *et seq.*(KWAA). Vested water rights are those which were developed before 1945 and all have the same priority and are senior to appropriation rights (unless and until determined otherwise by a Court) Appropriation rights are characterized by a water right file number. The lower the number is on an appropriation right, the older the date and therefore, the more senior the right.

Impairment is a concept that derives from a fundamental tenet underlying Kansas water law as expressed in the KWAA – "first in time, first in right". Specifically, K.S.A. 82a-706b states in part, "It shall be unlawful for any person to prevent, by diversion or otherwise, any waters of this state from moving to a person having a prior right to use the same..."

There are three water rights named in the instant action: Water Right, File No. 10,467 (File No. 10,467); Water Right, File No. 25,257; (File No. 25,275); and HS-03.

HS-03, as a vested water right, is senior to the other two water rights. File No. 10,467 is senior to File No. 25,257.

When the owner of a senior water right or vested water right is prevented from exercising that water right by the actions of a junior appropriator or by an unauthorized use of water, the senior water right or vested water right may be considered "impaired". When impairment is alleged, it is the duty of the chief engineer, division of water resources (DWR), Kansas department of agriculture to investigate such allegation and to take action to prevent it. DWR has issued regulations that govern its impairment investigation and actions in K.A.R. 5.-4-1 and 5-4-1a (attached).

Impairment actions in surface water systems are relatively straightforward and routinely done when there is not enough water available to satisfy all water rights.

When groundwater is involved, the issue of impairment is more complex. Groundwater is stored in the spaces between sands and gravels in what can be very complicated and variable systems of soils, sands and gravels, and clays. We have limited data to help us understand the composition of these diverse systems at a local level, principally well-drillers' logs. Our knowledge of any local underground water supply and how the system responds to pumping is also informed by observations and analysis of pumping times, pumping rates, and water levels. Compiling these data involves installing measuring equipment and collecting data from them over a time period that includes all or most of the prevalent pumping conditions that are encountered in a typical year. For this reason a groundwater impairment investigation can take one or several years to complete.

Using these observations and employing mathematical formulae that describe how water moves through aquifers, we are able to determine, to a reasonable degree of confidence, how each pumping operation affects the aquifer and each of the other wells in the local neighborhood. This data collection and analysis comprises the technical or fact-finding portion of the groundwater impairment investigation.

Because water in the ground moves much more slowly than water in a stream, reducing or shutting off a well with a junior right will frequently not have the immediate effect of making water available to the senior water right. The amount and timing of effects of pumping on other water rights is related principally to distances between wells and certain hydrologic properties of the aquifers, especially transmissivity[1] (T) and the storage coefficient[2] (S). In more productive aquifers (with relatively high T and S values), such as many parts of the Ogallala aquifer in western Kansas, these effect between wells are long-term and gradual, spanning months, years and even decades. In less productive portions of the aquifer (with relatively low T and S values), these pumping effects are much more significant and immediate.

In order to carry out our charge to maximize the beneficial use of water while preventing impairment, in groundwater systems DWR will utilize what we've learned about the aquifer and

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[1] [1] Transmissivity relates to how easily water moves through the pore spaces of the aquifer material. It is usually expressed in units of square feet per day or gallons per day per foot. The larger the number, the more easily water moves through the aquifer.

[2] Storage coefficient relates to how easily the aquifer gives up water in response to a change in pressure. In a confined aquifer, water is given up by a release of pressure on the water (or compression of the aquifer skeleton, or both) in the pore spaces which remain saturated. In an unconfined aquifer, water is actually drained out of the pore spaces and those pore spaces in contact with the atmosphere will actually become dewatered, i.e., some of the pore space is now occupied by air. Storage coefficient for an unconfined aquifer may be several orders of magnitude higher than that for a confined aquifer. This parameter is dimensionless. A low storage coefficient generally means that the water level in a pumping well must be drawn down more in order for the aquifer to release water. Correspondingly, the drawdown cone around the well is steeper and may extend out farther for a well in a confined aquifer than for a well accessing an unconfined aquifer.

the operations of the wells in the neighborhood to share the available water supply while ensuring that the senior water right is reasonably able to fulfill the purpose of his water right. This may mean varying degrees of reduction in pumping rate and/or quantity for junior pumpers according to their water right priority date and their effect on the senior water right.

When DWR began its 2005 investigation on a claim of impairment to HS-003, we installed water level monitoring equipment and began gathering data from that equipment which over a time would allow us to determine the degree of well-to-well interference that is occurring between HS-003 and the nearest five wells authorized by Water Right, File Nos. 10,467; 10,035; 11,750; 19,032 and 25,275, which were determined to pump from the same local aquifer as HS-03. Using water level data collected along with limited pumping rate information from these wells, DWR determined HS-003 and the five nearby wells pumped from the same local aquifer, and furthermore this location, the characteristics of the aquifer (it is a confined[3] aquifer with relatively low T and S values) are such that it reacts very dynamically to pumping stresses. We estimate that approximately one-half of the drawdown of water level at the senior vested right well HS-003 is caused by pumping the well HS-003 and the other half of the water level drawdown is due to pumping the five other wells. Approximately one-half of the drawdown caused by the other five wells is due to pumping of the two closest wells well 10,467 and well 25,275 – which are named in this action – and the other half is due to pumping wells 10,035; 11,750 and 19,032.

Based on the facts herein, especially the significant level of interaction between HS-003 and the neighboring wells, and the significant reductions in pumping levels and pumping rates during the irrigation season, it is apparent to DWR that the water available to well HS-003 is reduced by the interaction of the five neighboring wells noted above. However, DWR does not have all the information and data necessary to determine the extent of any impairment on well HS-003 by those neighboring wells.

Because the complaint was withdrawn, DWR did not complete the installation of pumping rate monitoring equipment at the six irrigation wells nor was a step drawdown[4] test performed to determine the optimum pumping rate of well HS-003. Thus DWR does not have information needed to determine how much the five nearby wells are reducing the pumping rate that would have otherwise been available to HS-003 or to determine whether a critical level of drawdown in HS-003 can be correlated with the rate HS-003 needs to be satisfied.

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[3] Confined aquifers are water-bearing zones between two impermeable layers, one above and one below. The water in a confined aquifer usually experiences pressures greater than atmospheric pressure and the water level in the well is due in part to this pressure. Well pumping quickly relieves the pressure caused by the confining layers and can cause much more dramatic drawdowns than are experienced in unconfined aquifers.

[4] A step drawdown test involves operating a well at a time when there is no interference from nearby wells. The well is operated at increasing rates, allowing the drawdowns to stabilize between successive increases in rate. Data are collected and analyzed from this test to determine the optimum rate at which a well can operate without interference from nearby wells.

To determine the degree to which HS-003 is being impaired and to craft a remedy which would allow HS-003 to be satisfied with the least detrimental impact to any nearby water rights, the following tests and resulting data would be necessary:

- Perform a step drawdown test at HS-003 at a time (typically early spring) when nearby wells are not pumping.
- Install water level transducers[5] and data loggers[6] in available pumping wells and observation wells in the area.
- Install rate loggers[7] on all pumping wells.
- Install telemetry[8] at the site so that all logged data can be uploaded to a web site for viewing and download by DWR. This gives DWR and the affected well owners the ability to monitor the equipment in near real time without the necessity of a field visit.
- Analyze data collected for an entire pumping season to quantify the effect each nearby well has on HS-003, both in terms of drawdowns and reduction in rate.
- Craft a remedy that will likely involve evaluation of alternating pumping schedules, a reduction in pumping times and or rates for some or all of the nearby wells, a target groundwater level in an observation well near HS-003 which would trigger reductions or cessation of pumping of nearby wells, other alternatives, or a combination of these.

The first counterclaim filed by Kelly and Diana Unruh, hereinafter Unruhs, argues that a change approved under HS-003 caused its priority date to change relative to Unruhs' File No. 10,467. The Unruhs assert that by changing the point of diversion of HS-003, Garetson Brothers have forfeited the seniority of that vested water right and furthermore that HS-003 is now junior in priority to Unruh's File No. 10,467. The change to the Garetson Brothers HS-003 was allowed by statute and was processed and approved in accordance with all rules and regulations that were in place at the time. The change did not move HS-003 closer to the Unruhs' well (File No. 10,467). And though the change allowed HS-003 to access the aquifer at a greater depth, thereby causing a greater direct effect to File No. 10,467; it is the right and responsibility of the senior water right to fully penetrate the available aquifer to the extent necessary to reasonably fulfill his or her right to beneficially use water. Such is the prerogative of the senior water right, and DWR does not construe such effects by senior water rights on junior water rights as impairment.

There have been changes approved under all three water rights at various times during their existence. When a change is approved the only attributes of a water right that change are explicitly set forth in the approval document; in all other respects (including priority date), the

[5] A water level transducer is a pressure transducer is attached to the end of a cable and lowered into the well. The weight of the water above the transducer is transformed into a voltage. As the water level changes (due to events such as pumping of the well, draw down from pumping of nearby wells, or recovery when all pumping in the area had stopped) the transducer reacts almost immediately.

[6] A data logger records the water levels from the water level transducer and time for specified time intervals.

[7] A rate logger records the pumping rate of a well and time for specified time intervals.

[8] Telemetry uses hardware and software to transmit logged data via satellite or cell phone to a telemetry provider which in turn makes the data available on its internet web site.

attributes remain unchanged. Attached are three tables (Attachments 13, 14, and 15) which list significant events in the history of each of these three water rights named in this action. It is noted that when the change in point of diversion under File No. 25,275 was approved in 2006, two observation wells (one existing and one new one) were required. This was done because at the time there was an active impairment investigation (the original 2005 complaint of impairment to HS-003) which involved File No. 25,275. DWR required the observation well to collect water level data and to observe and monitor any interactions between the two wells.

Process to Develop Water Rights

The Kansas Water Appropriation Act (KWAA) (K.S.A. 82a-701, *et seq.*) sets forth the process by which vested water rights and appropriation water rights are developed. Briefly, the process for vested water rights involves the person claiming a vested water right to file a "verified claim" documenting the use of water for a beneficial use prior to June 28, 1945. The Chief Engineer ultimately issues an order determining and establishing a vested right to the beneficial use of water. For appropriation rights, the process begins by a person filing an application for a permit to appropriate water. If the application meets statutory and regulatory criteria, the Chief Engineer issues an approval of application and permit to proceed. The approval sets forth the basic properties of the permit and provides a date by which the diversion works must be completed and another date by which the water right is to be perfected by the beneficial use of water in accordance with the terms of the permit. The Chief Engineer's staff will ultimately conduction a field inspection which will document the extent to which the water right appears to have been perfected. The field inspection is the basis on which the Chief Engineer will ultimately issue a certificate of appropriation which sets forth the properties of the water right.

The KWAA allows for changes to be made to a water right, subject to the approval of the Chief Engineer. This process involves the holder of the water right filing an application for approval to change the point of diversion, place of use, and/or use made of water under the water right. If the change application meets statutory and regulatory criteria, the Chief Engineer issues an order approving the change.

Attachments 13, 14, and 15 provide a brief outline of the significant events which have occurred relative to the three water rights involved in the case before the Court.

Steps to an Impairment Complaint pursuant to K.S.A. 82a-706b and K.A.R. 5-4-1

A copy of K.A.R. 5-4-1, DWR's current regulations regarding groundwater impairment investigations, is included as Attachment 12.

DWR would follow the procedure set forth below in the investigation of an impairment complaint.

First, if a water right holder believes that his or her water right is being impaired by water use related to a newer water right, he or she must file a written complaint with the chief engineer, or an authorized representative of the chief engineer. That usually is the water commissioner in charge of the field office that serves the area where the water rights are held by the complainant. Examples of typical impairment complaints are:

- Surface water from a stream is not reaching a senior water right holder because of an upstream diversion by a junior water right;
- A well authorized by a senior water right is not able to pump a sufficient amount of water to satisfy that right because of significant impacts due to pumping at one or more nearby wells authorized by junior water rights.

Second, an investigation of the physical conditions involved is conducted by the chief engineer or his/her authorized representative. Sometimes physical conditions are easily ascertained, such as a junior, upstream water right preventing water from flowing downstream to a senior water right. At other times, particularly in cases involving wells, more extensive investigation may be needed. In these cases it may be necessary to:

- Evaluate the condition of the complainant's well and pump system to determine if those are functioning properly and if the well is fully penetrating the aquifer;
- Conduct pumping tests to determine aquifer properties;
- Measure drawdown at the complainant's well and at nearby wells to determine the effects of their pumping.

Investigations often involve installation of equipment such as pressure transducers to measure water levels and data loggers to record water level measurements and pumping rates. It may be necessary to take measurements over one or more pumping season and to analyze the data to determine whether a right is being impaired.

Determining whether a right is being impaired is done on a case-by-case basis examining the physical conditions present and the water rights involved. Ultimately it comes down to whether the complainant with the senior water right can have that right satisfied by regulating junior water rights.

Third, a written investigation report is given to the complainant. The report indicates whether the investigation results substantiate the impairment claim. The complainant will be told if the

investigation indicates that the impairment is not occurring, or if regulating junior rights will not provide any relief to the complainant.

Fourth, if the report indicates that regulating junior water rights will provide relief to the complainant, and if the complainant desires such regulation to occur, the complainant must make a written request to secure water to satisfy his or her prior right.

Fifth, the chief engineer, or his or her authorized representative, issues written legal notice and directive to other water users whose water use must be regulated so the complainant's prior rights may be satisfied. When the quantity of water needed by the complainant has been delivered to his or her point of diversion (surface water intake, well, dam, etc.), or when the complainant discontinues his or her water use, water right holders whose water use was curtailed are allowed to resume using water. Likewise, if the water source should increase, the chief engineer, or his or her authorized representative, may allow some or all of the regulated junior water rights to resume use if it will not impair the senior water right.

An alternative to regulating junior water rights is for the impaired water right holder and impairing water right holder(s) to work out a mutually acceptable arrangement, such as rotating water use or other acceptable measures. Facilitated mediation is available through the Kansas Water Office to assist individuals seeking to resolve water disputes and achieve mutually acceptable outcomes.

Technical Report on Facts Pertaining to Garetson Brother's Original Complaint

Procedural Background

During March 2005, Garetson Brothers, operator and part owner of vested Water Right, File No. HS-003 filed a written impairment complaint against the nearest junior water rights File No. 10,467 and File No. 25,275. See Attachment 1. Gay Beth Moore is also an owner of vested Water Right, File No. HS-003, but was not part of the impairment complaint. The Kansas Department of Agriculture, Division of Water Resources (DWR), responded by letter dated May 26, 2005. See Attachments 2 and 3.

Figure 1 shows the locations of the irrigation wells referenced in this report.

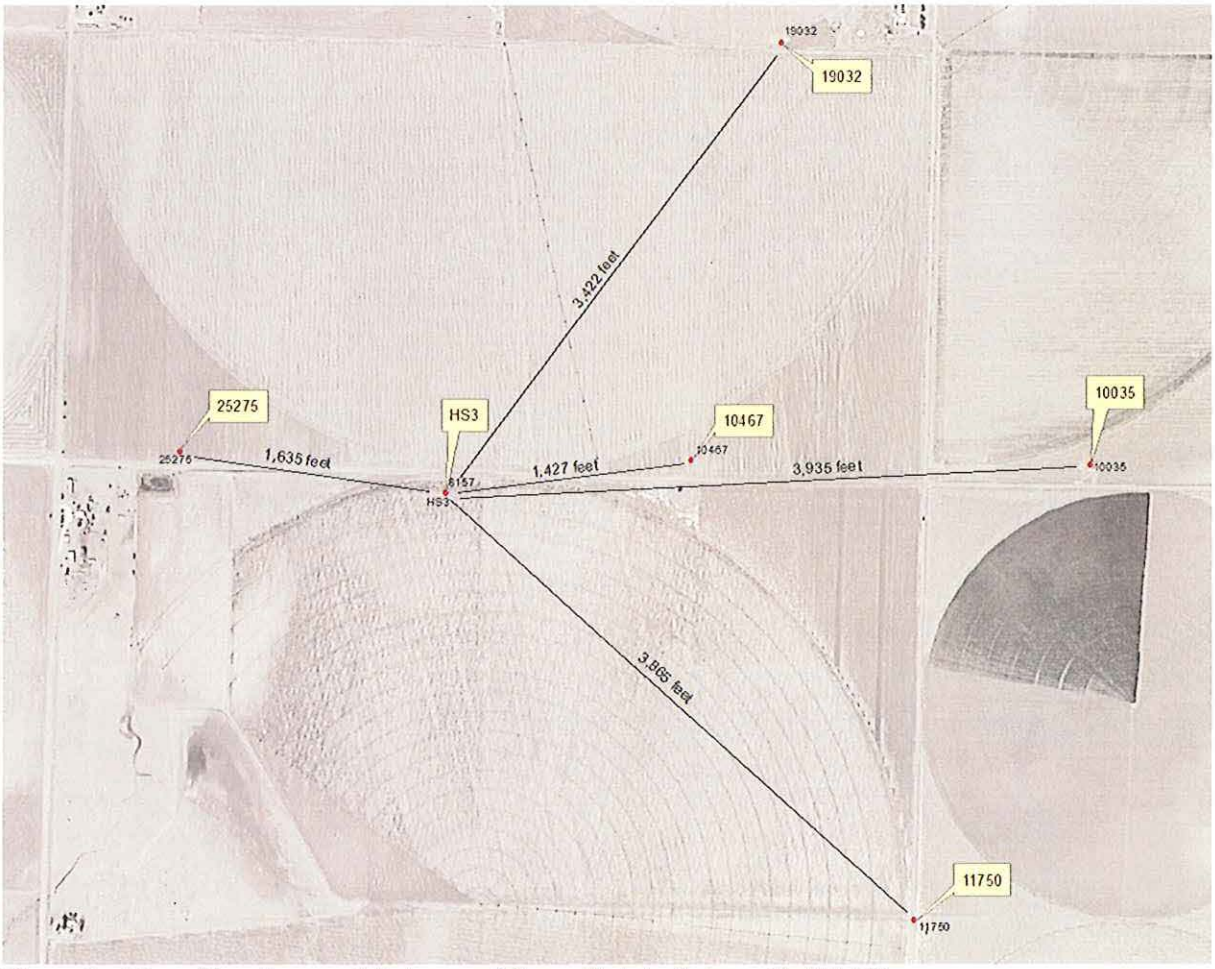


Figure 1 – Map of locations and distances of five wells interfering with HS-003.

As described below, DWR began its impairment investigation including the initiation of data collection at the site. By letter dated February 22, 2007 Jay Garetson submitted a formal

withdrawal of the impairment complaint for the Garetson Brothers. See Attachment 5. DWR responded to the withdrawal of the impairment complaint by letter dated March 20, 2007. See Attachment 6. DWR took no action but continued to collect data from the investigation site.

Water right development in the area including water right changes

Attachments 13, 14, and 15 provide an outline of significant events which have occurred relative to the three water rights involved in the case before the court.

In 2005 an application for approval to change the point of diversion of vested HS-003 was filed with DWR and an application for approval to change the point of diversion of File No. 25,275 was filed with DWR. Both applications to change the well locations were approved in 2006. This occurred while the impairment investigation was still open and therefore had a bearing on what data would be collected during the investigation.

A map showing the change in point of diversion of vested HS-003 from the previous location to 295 feet west and showing the change in point of diversion of File No. 25,275 from the previous location to 560 feet to the west is attached. See Attachment 4. Due to concerns of potential impairment, File No. 25,275 was required to include installing a deep observation well and to maintain the old well as a shallow observation well.

Hydro-geologic setting

Figure 2 is a depiction of the well drillers' logs of the area, showing the considerable variation in materials and water-bearing formations. Each column summarizes the type of material logged versus elevation above mean sea level. The most productive aquifer materials are shown in yellow and to a lesser extent tan. Impermeable layers, which produce little or no water and through which little or no water passes, are showing in gray and green. The red shows the portion of the well that is screened to allow water to enter the well. Over time the aquifer has declined in the local area such that most of the upper aquifer materials no longer yield water. Thus the wells are generally pumping from the limited lower aquifer zones.

The logs indicate that the wells where direct water level changes due to pumping were observed, wells 25275, 19032, 11750, and 10467, were drilled to the same deep water producing zones as vested Water Right, File No. HS-003 and they are all overlain by clay or sandy clay layers of the confined aquifer. It is also found that File No. 10,035 is located approximately the same distance from well HS-003 as well 19032 and well 11750, where direct drawdowns were observed, it is in the same direction as well 10467 and is completed and screened in the same water producing zone as well HS-003.

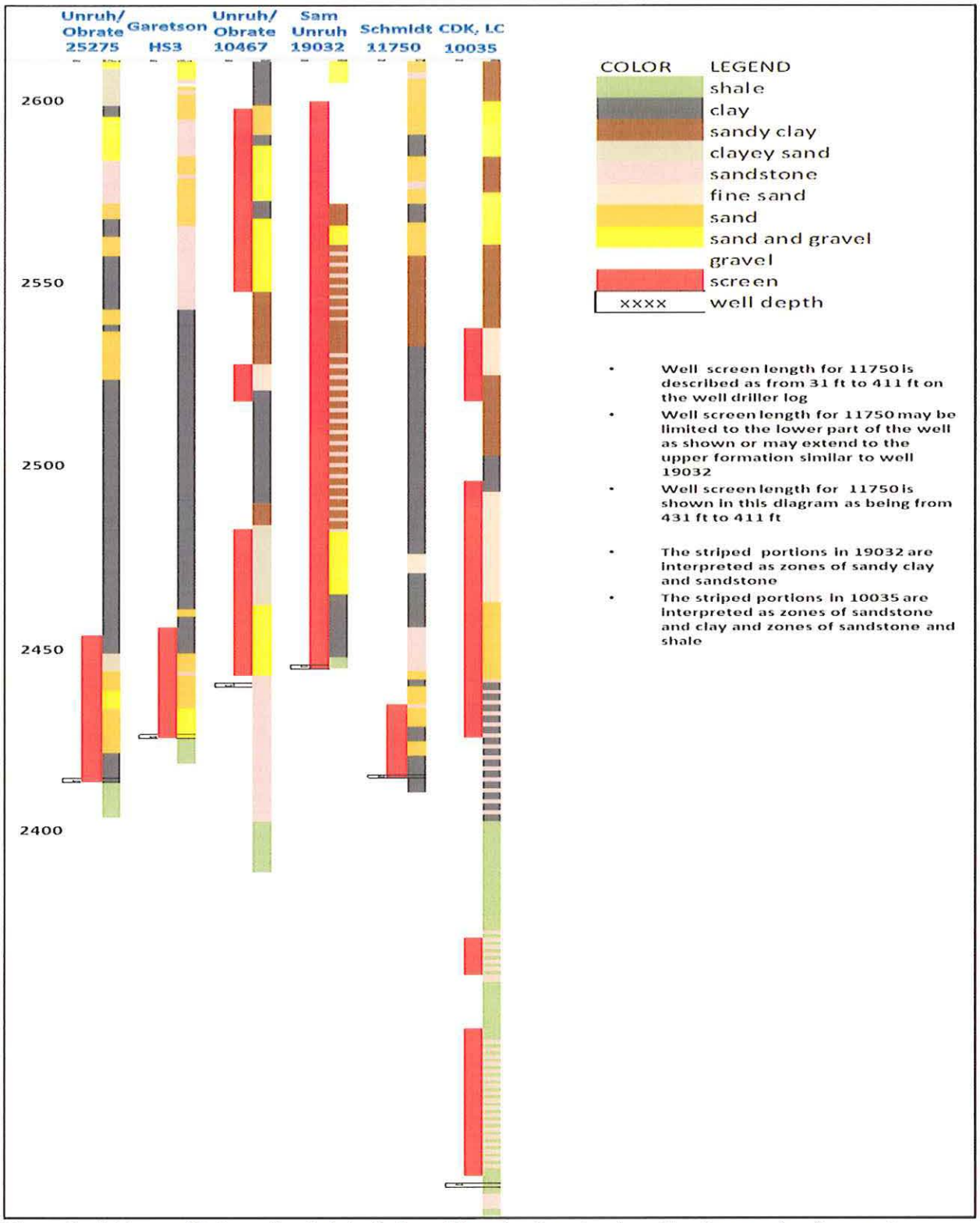


Figure 2 – Lithographic logs of wells interfering with each other showing all wells pumping from and screened in same zone as well HS-003 screened between 2456 and 2426 feet elevation

Data collection and monitoring

Because the cost of monitoring equipment was not budgeted at the time of the original complaint, monitoring equipment was ordered during 2006 but not set in place until 2007. Water level transducers with data loggers were installed in the wells HS-003, 11750, 19032, 25275, and the observation well (Obs25275). It was not possible to get them installed in the wells 10467 and 10035. Water level data was collected from these aforementioned installations during 2007. In addition, periodic water flow meter readings were recorded for wells HS-003, 11750, 19032, 25275, 10467 and 10035 during 2007.

Water levels were monitored with a pressure transducer [9] at well 25275 located 1,635 feet from HS-003 in 2007. Water meter readings were taken by DWR staff at times at wells HS-003, 10467, 25275 and other nearby wells. Meter readings at HS-003 were also supplied by Garetson Brothers. In October 2007 there was a period of time when water levels had recovered to near original pumping levels in 2007 and only well HS-003 was pumping making this a good time for aquifer tests.

[9] A pressure transducer is a water pressure sensor installed deep under the water in a well that electronically measures water pressure from the height of the water above the sensor and transmits data using an electric cable to a data logger above ground for conversion to water level elevation or depth to water relative to time.

Figure 3 below summarizes the key results from the data collection efforts of 2007.

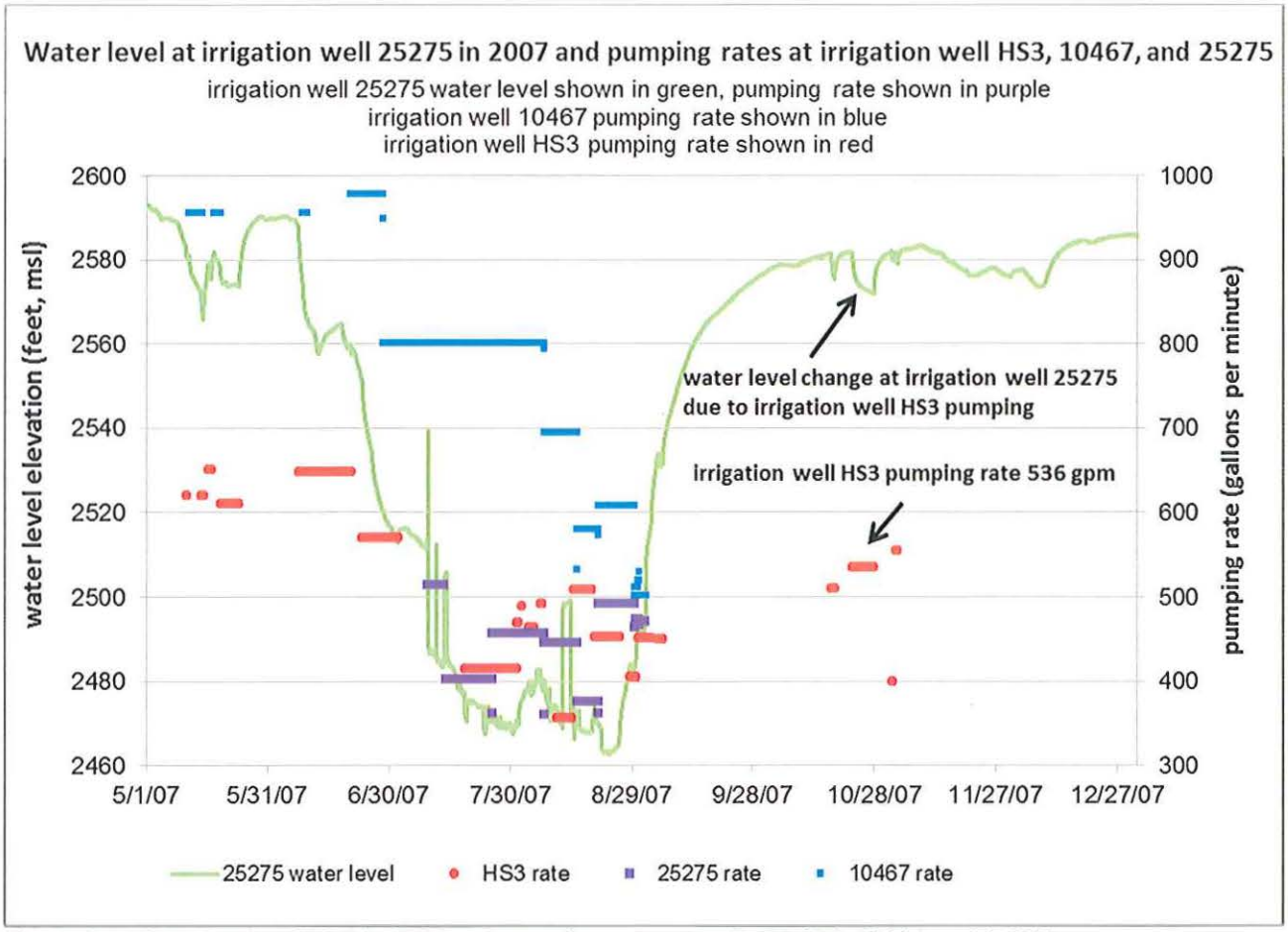


Figure 3 – Water level at 25275 in 2007 and pumping rates at wells HS-003, 10467, and 25275.

For example, the green line shows the water level elevation in well 25275 over the May to December 2007 period (read using the left vertical axis). The horizontal purple lines show the time period when the well was pumping and an estimate of the average pumping rate during that period (read using in the right vertical axis). Water level declines are seen in the well prior to its pumping. These declines are caused by the pumping of other wells in the area. In general pumping rates decline with declining water levels.

In October 2007, water levels were also monitored with pressure transducers at well 19032 located 3,422 feet from HS-003 and at well 11750 located 3,865 feet from well HS-003. The pumping rate for well HS-003 was 536 gallons per minute over a five day period. When well HS-003 started pumping the water level at well 19032 was an elevation of 2589.5 feet and the water level dropped to 2585.3 feet until well HS-003 stopped pumping. The water level change over this period was 4.2 feet. During the same period, the water level at well 11750, located farther away from well HS-003, changed from 2588.6 feet to 2586.0 feet (a change of 2.6 feet). Well 25275 located closer to the pumping well HS-003 than the other two wells monitored changed the most. The water level at well 25275 changed from 2581.7 feet to 2572.6 feet

(change of 9.7 feet) due to well HS-003 pumping. Water level changes of this magnitude and at these distances from the pumping well are typical of what would be expected when pumping in a confined aquifer setting.

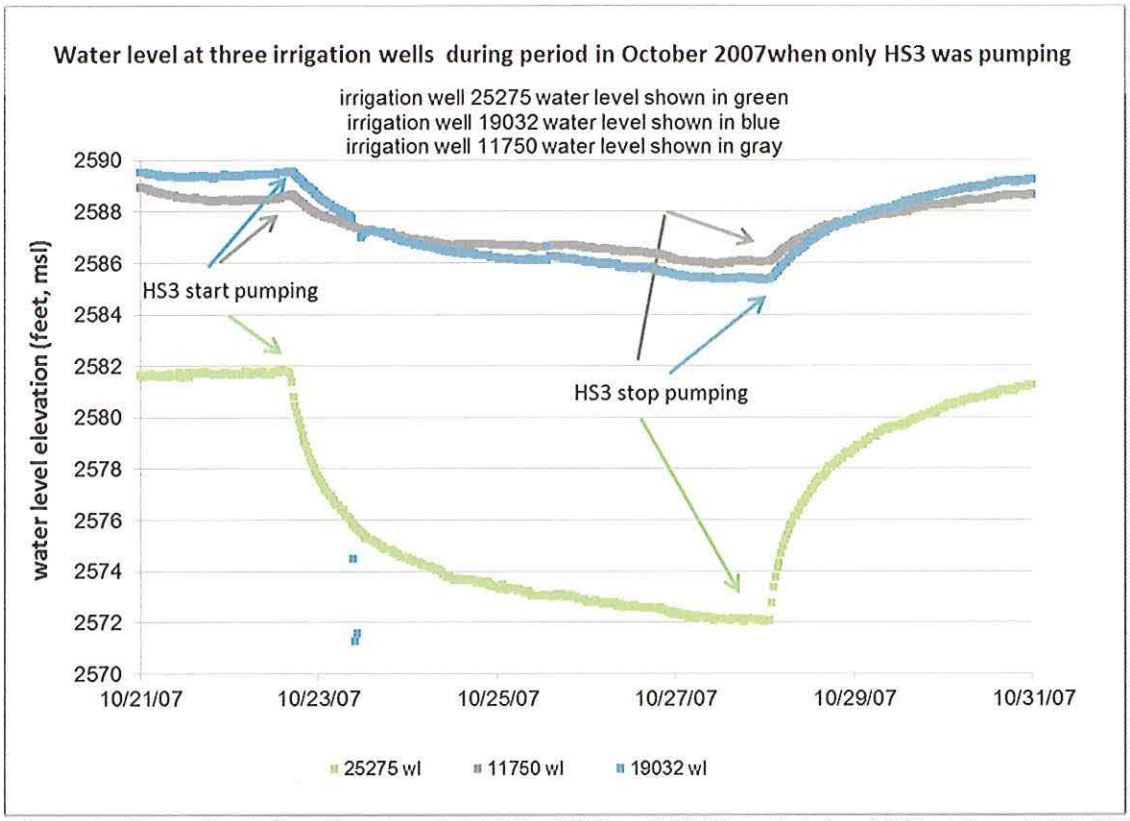


Figure 4 – Water level elevation at wells 25275, 19032 and 11750 in October 2007 while well HS-003 was pumping 536 gpm.

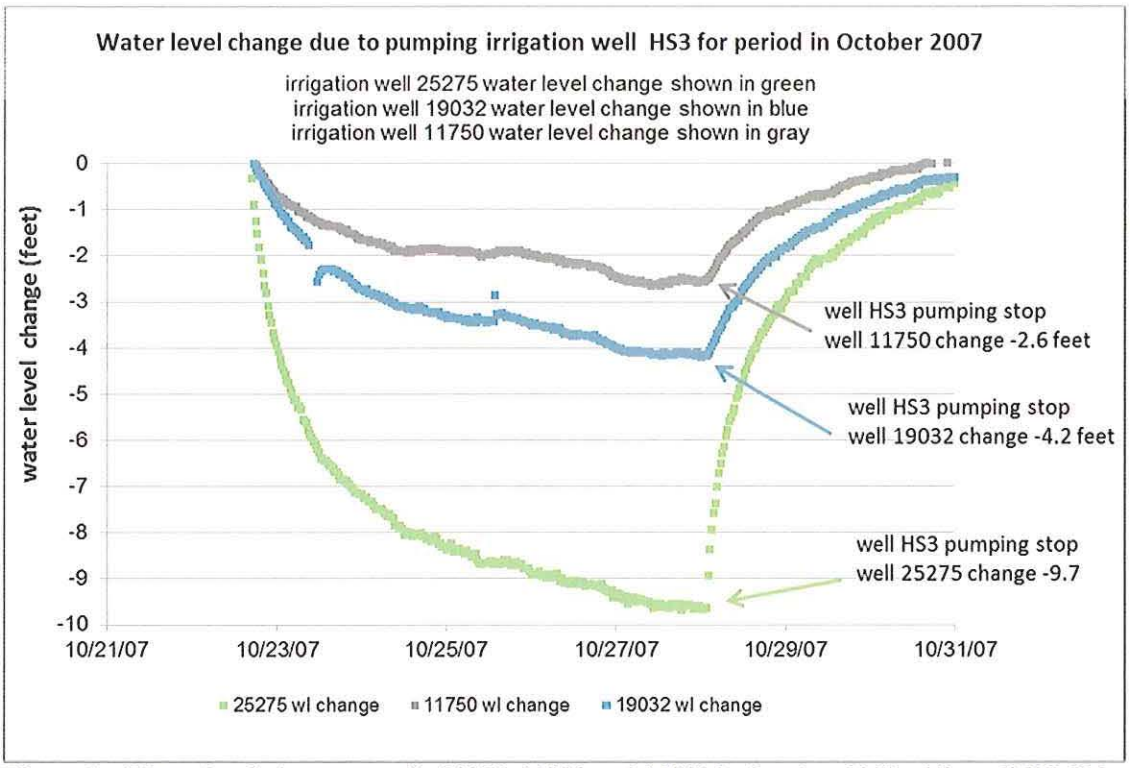


Figure 5 – Water level change at wells 25275, 19032 and 11750 in October 2007 while well HS-003 was pumping 536 gpm.

Figures 4 and 5 show that water levels declined at well 25275, well 19032, and well 11750 while well HS-003 pumped and recovered when well HS-003 stopped pumping. This water level change data while the well is pumping can be used to determine aquifer properties in each direction and shows that the three wells 25275, 19032, and 11750 will also cause drawdown in well HS-003 when they are pumped due to the aquifer properties.

Determination of estimates of Aquifer Properties

Based on data collected during October 2007, aquifer properties for the area were determined using a software product, AQTESOLV, into which water level data and pumping rates determined from the meter reading were entered. AQTESOLV[10] used the Theis Equation, a standard hydrological formula, to determine aquifer properties. These properties provide significant information about how an aquifer responds to pumping wells and can be used to predict water level drawdowns for different pumping rates and times.

[10] Theis equation and aquifer test analysis is described in Lecture Packet #8: Pump Test Analysis, Groundwater Hydrology, Prof. Charles Harvey, Civil and Environmental Engineering Course # 1.72, Massachusetts Institute of Technology. AQTESOLV* for Windows, Glenn M. Duffield, HydroSOLVE, Inc., AQTESOLV* is trademark of ARCADIS Geraghty & Miller, Inc., software was used for Theis equation analysis in this report.

Table 1. Theis Analysis of Pumping Test Data from October 2007				
Based on Drawdown at File No.	Transmissivity (gpd/ft)	Transmissivity (ft^2/d)	Storage Coefficient	Attachment
25275	30704	4104.8	0.0001345	7
19032	46119	6465.7	0.0002602	8
11750	88937	11890	0.0002565	9

During a period in May 2007 water levels were measured at Garetson Brother's irrigation well HS-003 while well 19032 pumped for three days at a rate of 558 gallons per minute and irrigation well 10467 pumped for three days at a rate of 955 gallons per minute. HS-003 also pumped briefly at 620 gallons per minute. When well 19032 started pumping the water level at well HS-003 was at elevation 2592 feet and at the end of the test period the water level dropped to 2580 feet for a water level change of 12 feet. Figures 6 and 7

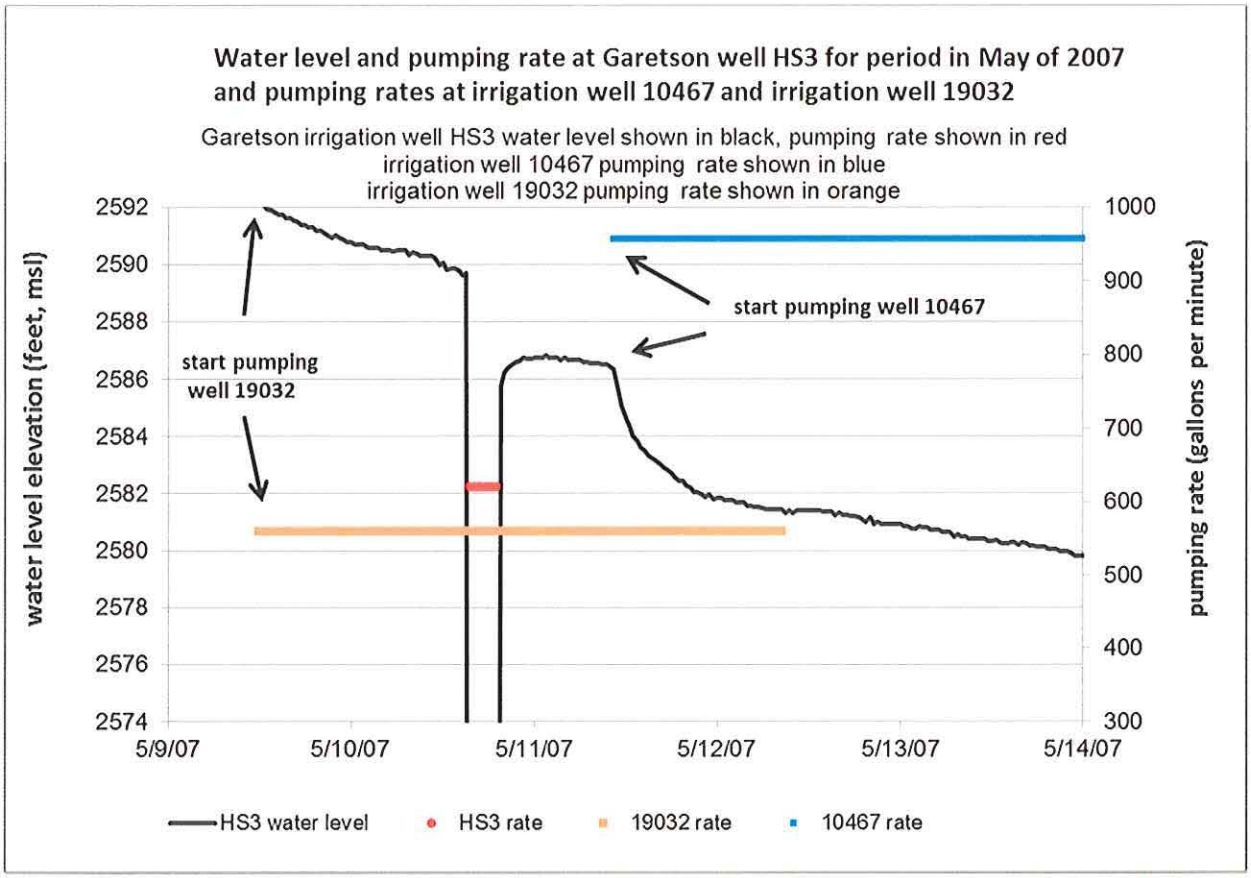


Figure 6 – Water level elevation at Garetson well HS-003 while well 19032 pumped three days at 558 gpm, well HS-003 pumped briefly at 620 gpm, and well 10467 pumped 955 gpm for three days.

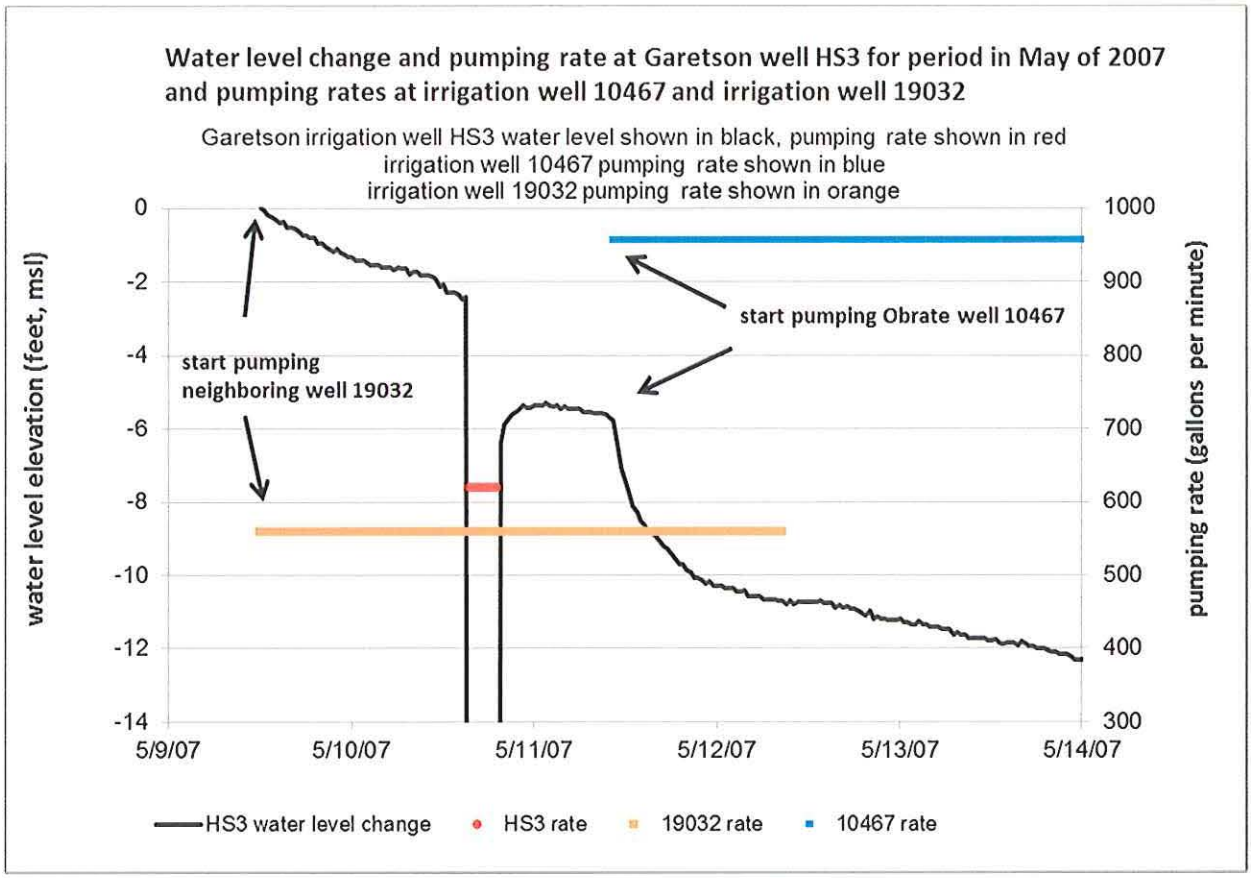


Figure 7 – Water level change at Garetson well HS-003 while well 19032 pumped three days at 558 gpm, well HS-003 pumped briefly at 620 gpm, and well 10467 pumped 955 gpm for three days.

Results from the analysis of the pumping test data in October 2007 based on pumping well HS-003 and measuring drawdowns at irrigation well 19032 located 3,422 feet northeast was correlated with observed drawdown at well HS-003 in May 2007 using the Theis solution while well 19032 pumped for three days and well 10467 located 1,427 feet east pumped three days. Significant correlation was found indicating an aquifer transmissivity of 46,119 gallons per day per foot (6165.7 ft²/d) and storativity of 0.0002602 to the east in the direction of well 10467 as found to the northeast in October 2007. These aquifer properties can be used to predict well drawdown between well HS-003 and well 10467. See Attachment 10.

A water level transducer could not be installed at well 10035 but due to the distance, direction, same water producing zone, and well screening it appears that well interference to well HS-003 by pumping well 10035 would be determined by a confined aquifer transmissivity of 46,119 gallons per day per foot (6165.7 ft²/d) and storativity of 0.0002602 as found at well 10467 and well 19032. These aquifer properties can also be used to predict well drawdown between well HS-003 and well 10035.

Based on analysis of pumping test data in October of 2007 and well driller logs it appears that the five nearest wells drilled and screened in the same confined aquifer as vested Water Right, File No. HS-003 directly interfere with available water for HS-003. The five junior water rights directly interacting with HS-003 in order of distance from HS-003 are: Water Right, File No. 10,467 (10467), Water Right, File No. 25,275 (25275), Water Right, File No. 19,032 (19032), Water Right, File No. 11,750 (11750), and Water Right, File No. 10,035 (10035). The distances are 1,427 feet for 10467, 1,635 feet for 25275, 3,422 feet for 19032, 3,865 feet for 11750 and 3,935 feet for 10035.

Potential critical pumping levels

Water levels were monitored in 2012 at Garetson well HS-003 and the most junior water right well 25275. The pumping level at well HS-003 reached an elevation of 2450 feet or a depth to water of 404 feet that is 6 feet below the top of well HS-003 well screen the first week in June. In July 2007 the water level at well 25275 dropped to 13 feet below the top of the well screen at well 25275 while it was pumping. See Figure 8.

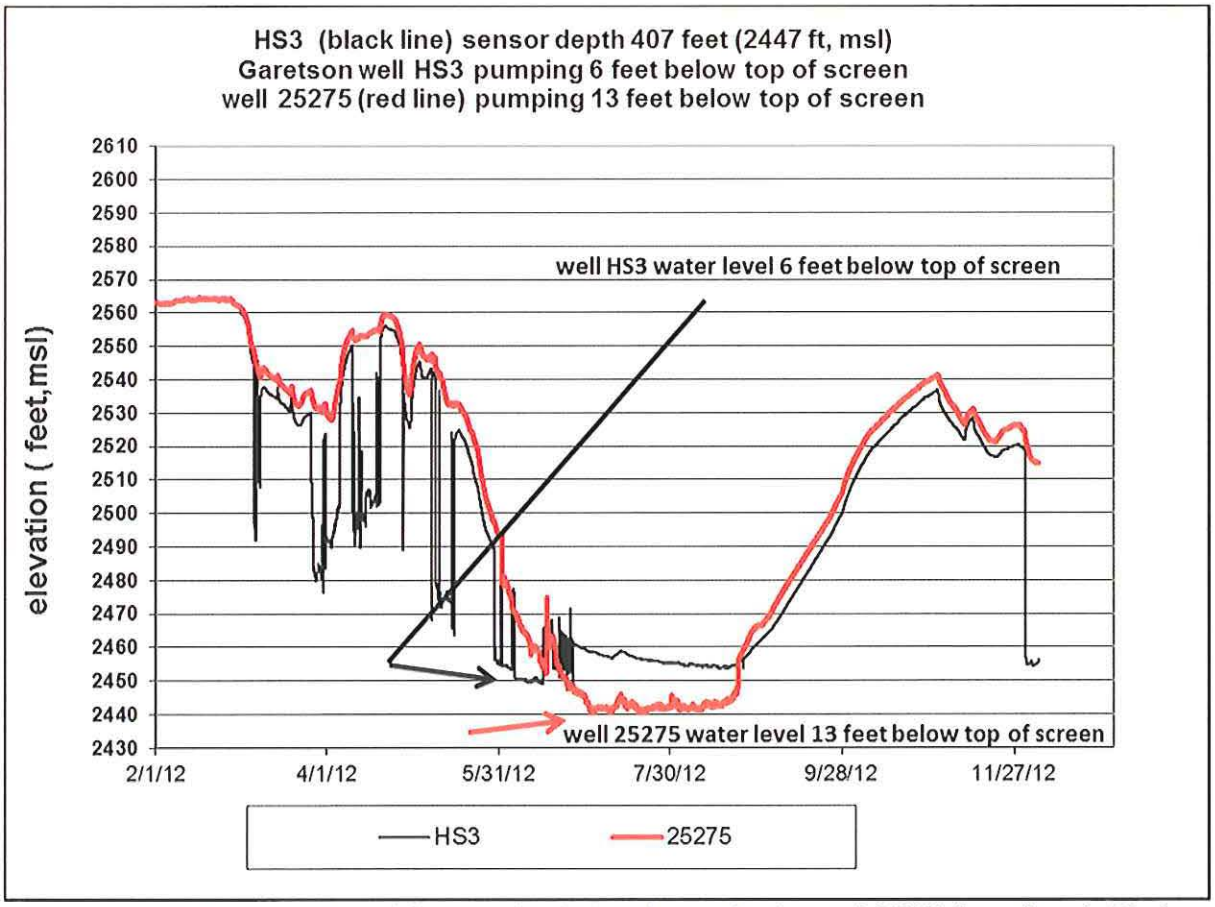


Figure 8 – Water level at well HS-003 shown in black and water level at well 25275 shown in red. Black arrow points to well HS-003 water level 6 feet below top of well screen while pumping first week in June. Red

arrow points to water level at well 25275 while pumping 13 feet below well screen in July. Well HS-003 was not pumping while well 25275 was pumping most of the summer 2012.

Well screen length is only 30 feet in the bottom of well HS-003 and it only screens 23 feet of water bearing formations of which 8 feet is sand and gravel underlying 14 feet of sand with one foot of sandstone. The water bearing zones are overlain by 10 feet of clay of which 7 feet is screened and the clay is overlain by only 2 feet of sand that is not screened. It may be possible to apply more power to well HS-003 as there appears to be more pumping depth available but it is generally not acceptable to pump a well below the top of the well screen in such conditions, however, this does not represent a critical water level at which HS-003 would be impaired. Typical optimum pumping level[11] is 67% of available drawdown and based on a preseason water level of 2564 feet elevation an optimum level may be 2472 feet at well HS-003 which would be a pumping level of 382 feet to water which is 17 feet above the well screen and 5 feet above the bottom sand zone above the screen. Typical optimum pumping level was not exceeded in 2012 until the second week in May. See Figure 9.

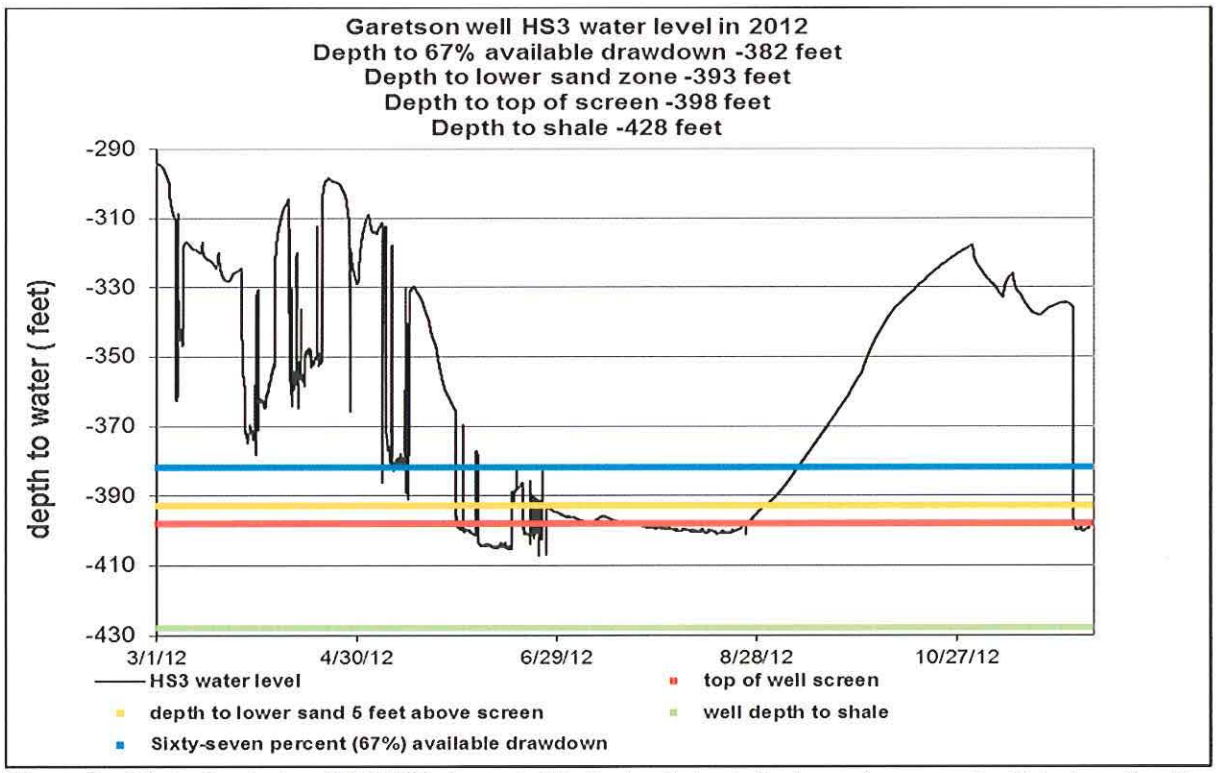


Figure 9 – Water level at well HS-003 shown in black, depth to shale shown in green, depth to top of well screen shown in red, depth to lower two feet sand above screen shown in orange, depth to 67% typical optimum pumping level shown in blue.

[11] Ground Water and Wells, Johnson Inc., 1966

Simulated pumping rates and potential drawdowns

DWR obtained meter readings on March 1, May 15, July 19, and December 5 at well HS-003 and the five wells interfering with the senior water right in 2012. Based on pumping times from observed drawdowns the pumping rates were derived between the meter reading times. It appears that the water meter at well HS-003 may have not been properly recording the volume of water pumped in 2012 as the early season pumping rate based on the meter readings and pumping times was only 239 gpm while the pumping level was above safe levels. But certainly during the summer when well HS-003 was not pumping the water level at well HS-003 continued to decline below optimum level while other wells continued to pump. Figure 10

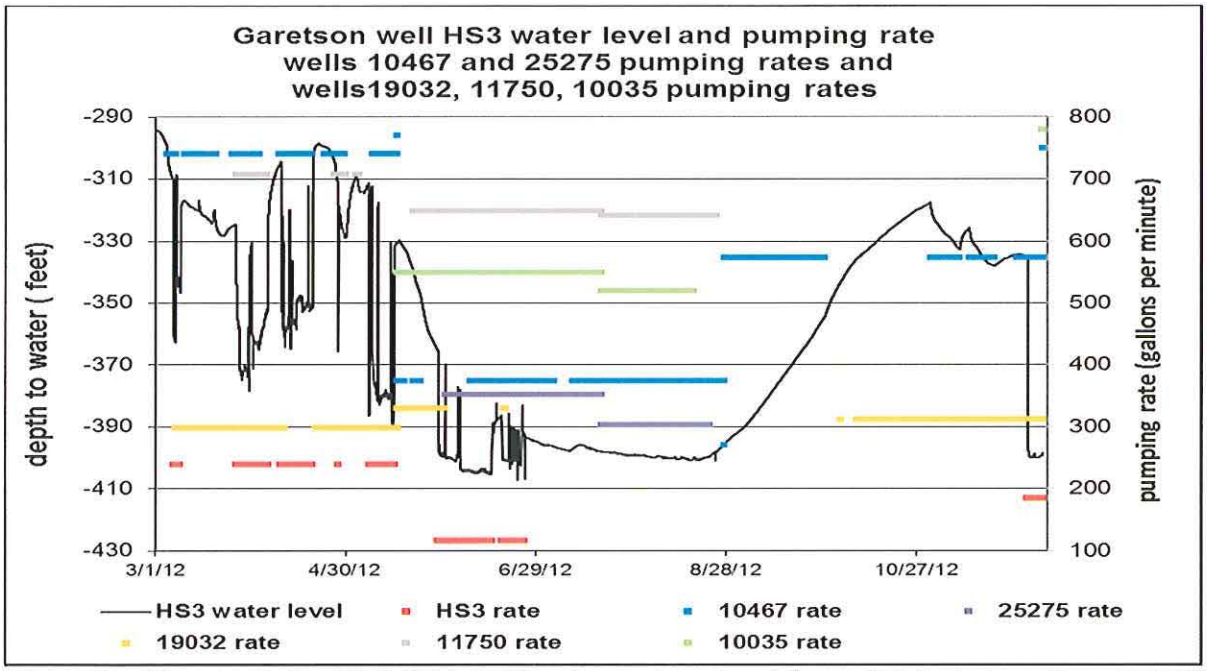


Figure 10 – Water level at well HS-003 in 2012 and pumping rates at five wells interfering with well HS-003.

Table 2 shows results of simulated drawdown at well HS-003 caused by pumping the five neighboring wells and well HS-003 assuming all six wells start pumping at the same time and pump for 100 days at 750 gallons per minute (gpm) or a lesser rate depending upon the authorized quantity. A rate of 750 gpm is a typical desired well for a 100 day period. The pumping rate for well 25275 would be 362 gpm, well 19032 would be 489 gpm and well 10035 would be 713 gpm due to the authorized quantities of 160 acre-feet, 216 acre-feet, and 315 acre-feet, respectively. The two nearest wells to well HS-003, wells 10467 and 25275, pump 26 percent (26%) of the drawdown caused by the six wells and the three more distant wells, well 19032, well 750, and well 10035 pump 25 percent (25%) of the total drawdown and well HS-003 accounts for 49 percent (49%) of the total drawdown. The two nearest wells account for about one half of the drawdown caused by the five wells.

	Distance from well HS3 (feet)	Direction	Authorized Rate (gpm)	Simulated Rate (gpm)	Simulated Pumping days	Transmissivity (gpd/ft)	Storativity	Drawdown at well HS3 (feet)	Percent of total drawdown (percent)
10467	1427	east	1000	750	100	46119	0.0002602	14.7	15%
25275	1635	west	1200	362	100	30704	0.0001345	10.6	11%
19032	3422	northeast	930	489	100	46119	0.0002602	7.4	8%
11750	3865	southeast	1650	750	100	88937	0.0002565	6.3	7%
10035	3935	east	1195	713	100	46119	0.0002602	10.3	10%
HS3	at well	at well	601	543	100	28995	0.0003006	46.7	49%
							total	96	100%

Table 2. Drawdown at well HS-003 caused by pumping well HS-003 and five interfering wells.

Theis drawdown at well HS-003 caused by pumping that well shown in Table 2 was simulated using an aquifer transmissivity of 28,995 gallons per day per foot (3876.4 ft²/d) and storativity of 0.0003006. These confined parameters were based on observed drawdown at an observation well located 1,459 feet west drilled and screened in the same confined sand zone as well HS-003. The observation well was the closest point measured to well HS-003 so those aquifer properties were used to estimate drawdown at well HS-003 by pumping well HS-003 as a step drawdown test had not been conducted. (Attachment 11)

Conclusions

Data available to DWR indicates a likely impairment at well HS-003 when water reaches a critical level due to pumping from one or more of the five wells indicated. More testing and data would be necessary to determine the level of impairment. A critical water level has not been determined due to a step drawdown test not having been conducted. Once a critical pumping level is determined monitoring equipment, including telemetry at well HS-003 to monitor the pumping rate and water level, and telemetry to monitor pumping rates of the other five wells and water levels at available sites, will be needed. The water meter monitoring equipment and water level monitoring equipment must be maintained in working order and available to DWR. Soil moisture monitoring equipment should also be used to assure any distribution of water is efficiently applied to beneficial use.

Attachments

Attachment 1 – Garetson Brothers Impairment Complaint letter dated March 9, 2005.

GARETSON BROTHERS
2394 120 th Road
Copeland, KS 67837
(620)668-5667

March 9, 2005

Division of Water Resources
2508 Johns Street
Garden City KS 67846

Mr. Michel Meyer, Water Commissioner:

Our families have become increasingly concerned that the added price we paid for real estate in Section 36, Range 27, Township 31, Haskell County, Kansas with vested water right #003, drilled in the 1930's and Vested Water Right applied for September 12,1950, has continued to be jeopardized to this date. This well was re-drilled in the 1976 after another well ,Water Right # 10,467 dated November 12,1964, was drilled in the south center of the south side of SE 25-27-31 (about ¼ mile east of the original 003 well). Then after our well was re-drilled, they had to re-drill in 1994.

In 1975 a second well, Water Right # 25,275, was drilled less than ½ mile to the west of our vested well, #003, (south center of south side of SW 25-27-31). All three of these wells only have a cow path separating them north to south.

Do to these two neighboring wells competing for the same underground water as our vested #003 we are convinced these junior wells have impaired our water rights. Rumor has it that the west well, #25,275, is to be re-drilled this summer (SW 25-27-31). If this is allowed, it will continue to deplete water at an even lower depth than last year. Last year our vested well #003 declined from 750 gpm to 300 gpm. This required us to re-nozzle our sprinkler twice during 2004 summer, forcing us into a re-drill situation ourselves.

We would like to see the teeth of water justice to be exercised in our Vested vs. Senior & Junior water right situation.

This is high priority in our families' irrigated farming practice! We feel very strongly that not much has been gained in supervising these priorities since Jesse J. Garetson served on the GMD3 in the 1980's.

Please Act Promptly,
Garetson Brothers

Jesse L. Garetson
Jesse L. Garetson

Jerra L. Garetson
Jerra L. Garetson

Jay R. Garetson
Jay R. Garetson

Jarvis D. Garetson
Jarvis D. Garetson

Cc: GMD3 Attn. Mark Rude, Executive Director

RECEIVED
MAR 1 1 2005
Garden City Field Office
Division of Water Resources

Attachment 2 – Written response to Garetson Brothers dated May 26, 2005.

AD ASTRA PER ASPERA
KANSAS

COPY FOR YOUR INFORMATION

DEPARTMENT OF AGRICULTURE
ADRIAN J. POLANSKY, SECRETARY

KATHLEEN SEBELIUS, GOVERNOR

May 26, 2005

Garetson Brothers
2394 120th Road
Copeland, KS 67837

RE: Impairment Complaint Received March 14, 2005 for File Number HS 003

Dear Sirs:

We are acknowledging receipt of your impairment complaint dated March 9, 2004, for Vested Water Right File Number HS 003. You should have been contacted by the Water Commissioner from the Garden City Field Office about your complaint. We presume that you remain committed to the complaint as filed.

It is our intent to conduct a formal field investigation of the site at the location of the well under Vested Water Right File Number HS 003 and surrounding area beginning this pumping season. You should expect staff from our field office and headquarters technical services unit to be in the area possibly several times in the coming months to collect additional pumping and water level data from your well under Vested Water Right File Number HS 003 and those nearby. Their work will be addressing the factual requirements of impairment pursuant to K.S.A. 82a-711(c) in the Kansas Water Appropriation Act. Initially, our work will be focused within a two-mile circle around the well under Vested Water Right File Number HS 003. We may determine that the investigation is able to be more confined or that it must be expanded as the investigation proceeds.

The general objective of the investigation is to define the effects of other wells on your well and the water levels in the area. We will obtain information from you and others in the area and from records on changes in water levels and pumping rates. In addition, we will be measuring water levels and pumping rates of your well and other wells in the area to determine the effects of current pumping on water levels. Other data that we consider important are the aquifer characteristics and well construction information for each well we believe might either directly or indirectly be an influence on your well. We will consider your concerns with wells in Section 25, Township 27S, Range 31W in the decisions we make. We must also assess the effects of other wells in the area to complete our investigation.

RECEIVED
MAY 31 2005
Garden City Field Office
Division of Water Resources

Division of Water Resources David L. Pope, Chief Engineer
109 SW 9th St., 2nd Floor Topeka, KS 66612-1283
Voice (785) 296-3717 Fax (785) 296-1176 http://www.accesskansas.org/kdo

Attachment 3 – Written response to Garetson Brothers dated May 26, 2005.

We have not yet informed owners of other Water Rights in the area of this activity. It is our intent in the near future to invite all Water Right owners, and their tenants, within two miles to have a group discussion of the specific work plan for the next two seasons. If you should have questions please contact the Water Commissioner in Garden City.

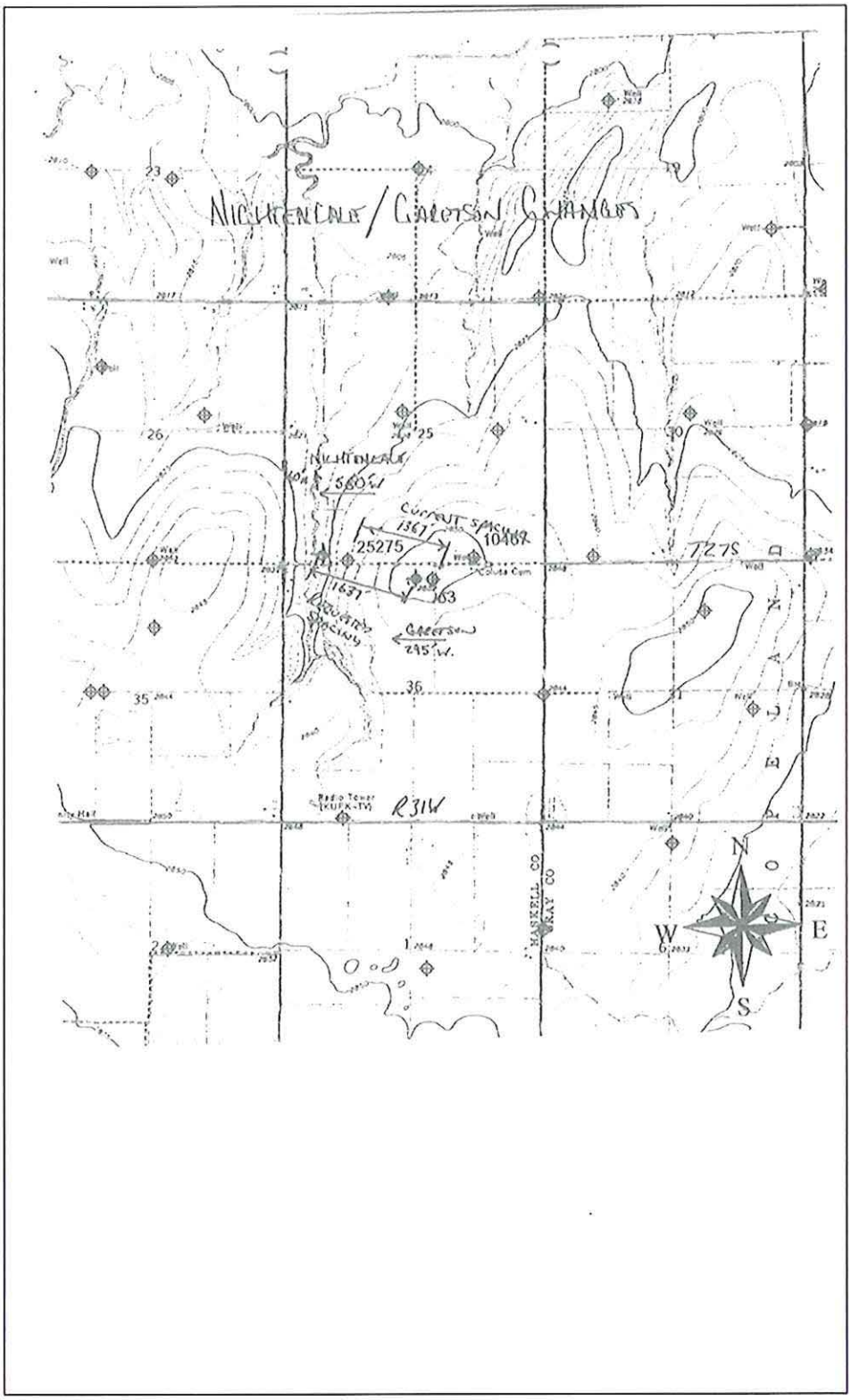
Sincerely,

Thomas L. Huntzinger, P.E.
Water Appropriation Program Manager

TLH:jml

pc: David L. Pope, Chief Engineer
Dan Riley, Chief Counsel
Lane Letourneau, Water Use Unit
Katie Tietsort, Water Commissioner, Topeka Field Office
Bruce Falk, Water Commissioner, Stafford Field Office
Scott Ross, Water Commissioner, Stockton Field Office
Mike Meyer, Water Commissioner, Garden City Field Office
Mark Rude, Executive Director, GMD No. 3
Tina Alder, Basin Team

Attachment 4 – Map showing changes in well locations of vested Water Right HS-003 and Appropriation of Water, Water Right File No. 25,275 in 2006.



Attachment 5 – Garetson Brothers withdrawal of impairment complaint dated February 22, 2007.

HS003

Garetson Brothers

Garetson Brothers
2394 120th Road
Copeland, KS 67837
Ph. 620 675 2459

February 22, 2007

Division of Water Resources
2508 Johns Street
Garden City, KS 67846

Mr. Michael A. Meyer, Water Commissioner,

In regards to the claim of impairment to our Vested water right #003, located in section 36, township 27, range 31, Haskell County, Kansas. We formally withdraw the impairment petition.

During the nearly two years since we filed for relief, our goal has been to bring attention to the urgent state of decline of the Ogallala Aquifer in GMD #3. Rather than being a positive catalyst for change in the effort to extend the useful life of the aquifer as a whole we have been perceived as selfishly damaging our neighbors for our own gain. If the final result of the impairment action were implemented only on the junior wells in the immediate vicinity of HS #003 while the status quo of rapid depletion was allowed to continue unaddressed in the rest of GMD #3, then those inaccurate perceptions of our family's intentions, would become "proven" in the eyes of our friends, and neighbors. Additional damage to the aquifer would result if pro-depletion interests gained traction in their efforts to maintain the current policy of accelerated resource recovery, by focusing the public debate on our individual actions, versus the common, long term, extension of this precious resource, and the attending economic benefits. This is a massive, long term, natural resource and economic challenge that cannot be significantly impacted by any individualized reduction. The only realistic hope for our common future water needs is through a comprehensive sharing of the rapidly expanding water shortage, that nearly all large scale water users have witnessed first hand.

There are no painless solutions today. However, even modest reductions in maximum allowable annual or multi-year allocations begun immediately can change the severity of decline and buy time for higher value per unit uses to emerge and increasing efficiencies to be developed and employed.

New initiatives should be very careful not to penalize past water conservation by those who withdrew less water from their points of diversion, than their maximum appropriation rights would have allowed.

The people of Kansas and those within the confines of GMD#3 no less so, are industrious, creative, persevering, and mindful of their posterity. If these characteristics can be focused on, and engaged in a common effort we will be proven worthy stewards once again of the great blessings endowed us by our Creator and extended by the many struggles and sacrifices of our ancestors on our behalf.

Please act promptly,

Garetson Brothers

Jesse J. Garetson

Jerra L. Garetson

Jay R. Garetson

Jay R. Garetson pdr

Jarvis D. Garetson

CEIVED
FEB 2 3 2007
...n City Field Office
...n of Water Resources

WATER RESOURCES
RECEIVED
FEB 2 8 2007
KS DEPT OF AGRICULTURE

Attachment 6 – Written response to Garetson Brothers dated March 20, 2007

KANSAS

DEPARTMENT OF AGRICULTURE
ADRIAN J. POLANSKY, SECRETARY

KATHLEEN SEBELIUS, GOVERNOR

March 20, 2007

Garetson Brothers
2394 120th Road
Copeland KS 67837

RE: Vested Right, HS 003
Impairment investigation

Dear Garetson Brothers:

This correspondence will acknowledge receipt of the formal withdrawal of your impairment petition for Vested Right, HS 003 dated February 22, 2007.

This agency will no longer pursue the investigation as an impairment investigation as outlined in K.A.R. 5-4-1.

Your area remains an area of interest. This agency plans to redefine the study. The infrastructure of monitoring wells and equipment is in place. We have a substantial amount of public resource dedicated to this site. Therefore, we will continue monitoring the area and record data. We still plan to conduct a pump test this season, which is a permit condition required on a nearby well.

We have made your comments and concerns a matter of record. We appreciate the cooperation you have provided as part of this study.

Should you have any questions please feel free to contact this office.

Sincerely,

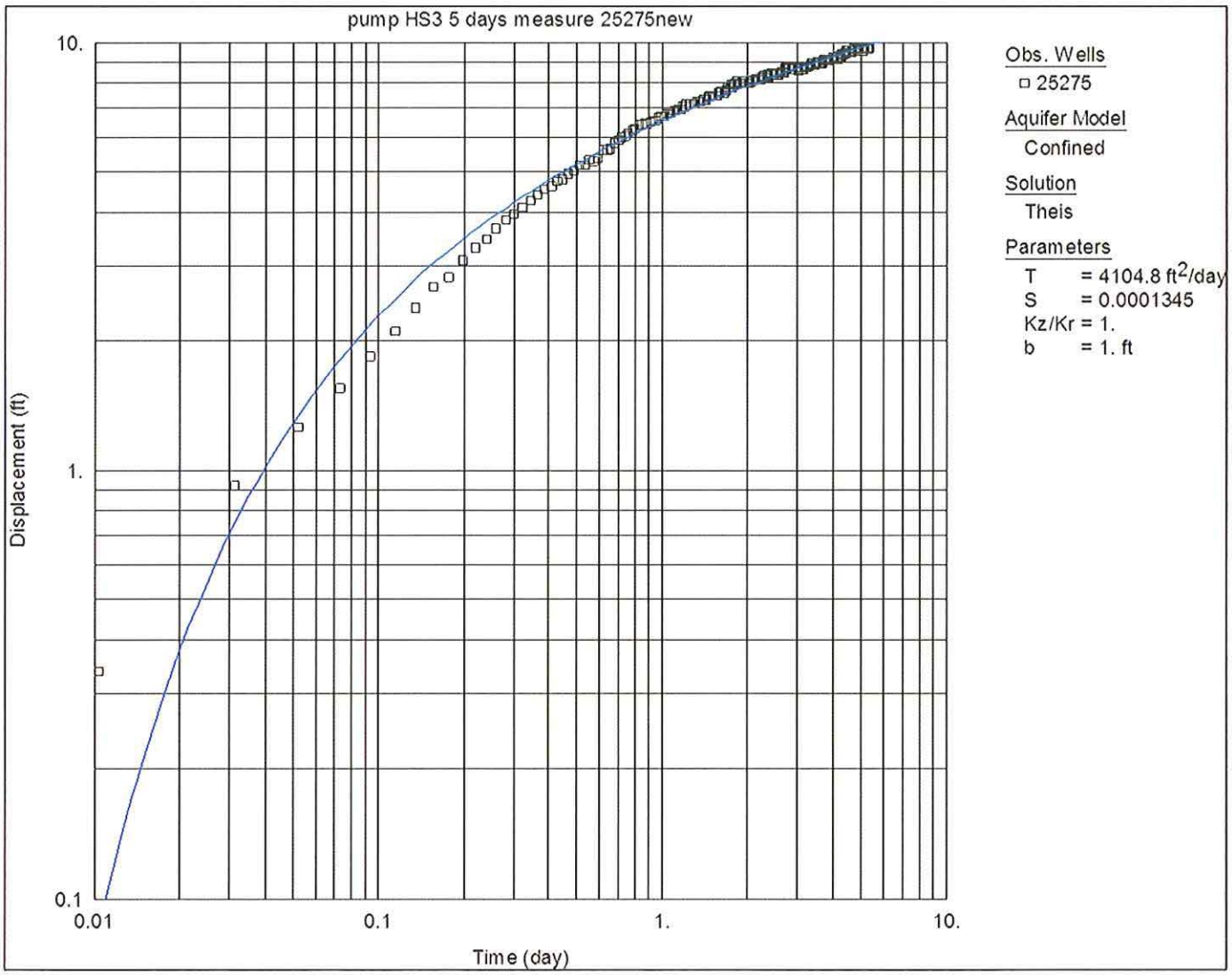
Lane P. Letourneau, L.G.
Program Manager
Water Appropriation Program

pc: ~~Mike~~ Meyer
Mark Rude
Kelly Warren
John Munson

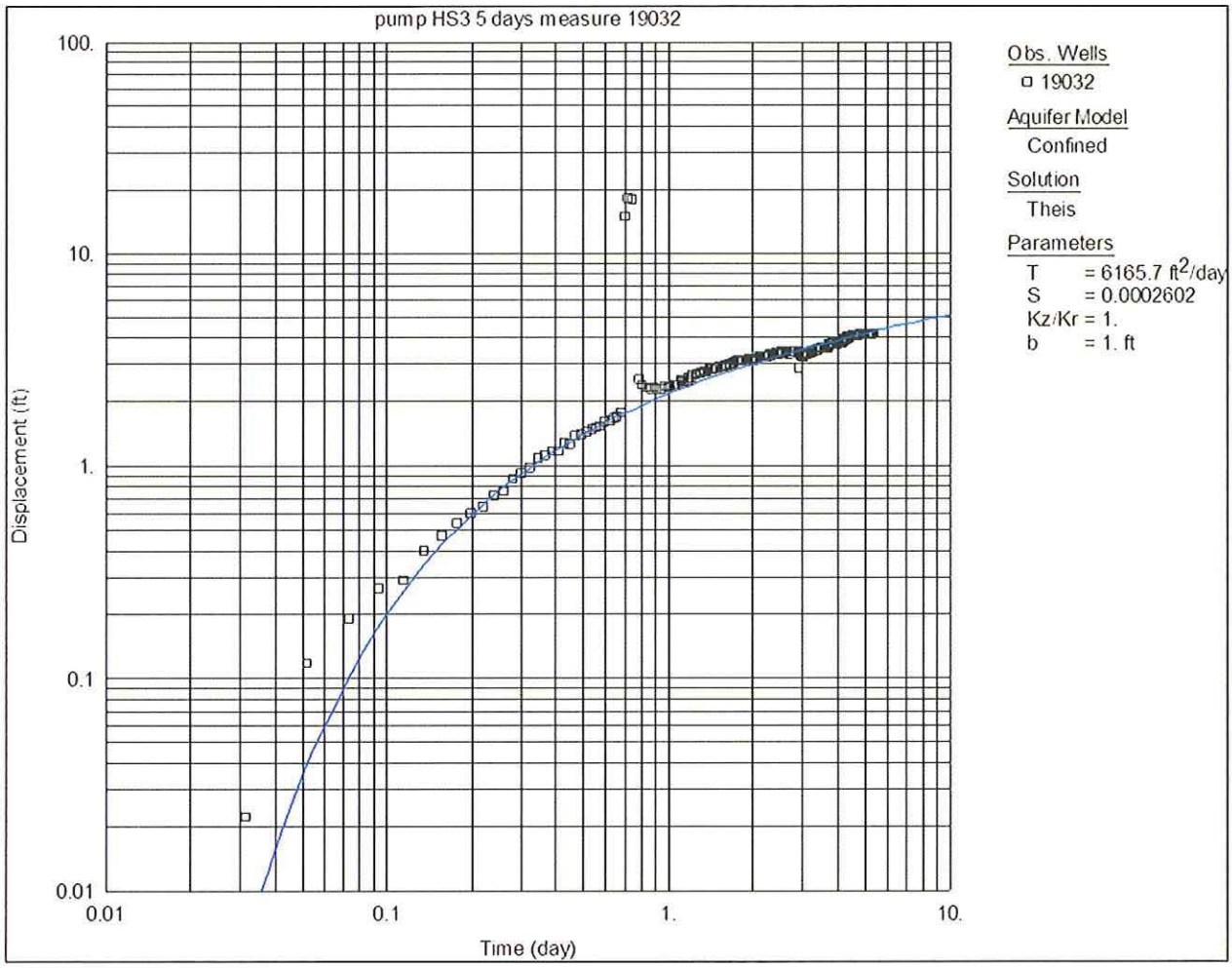
RECEIVED
MAR 2 2 2007
Garden City Field Office
Division of Water Resources

Division of Water Resources David L. Pope, Chief Engineer
109 SW 9th St., 2nd Floor Topeka, KS 66612-1283
Voice (785) 296-3717 Fax (785) 296-1176 http://www.ksde.gov

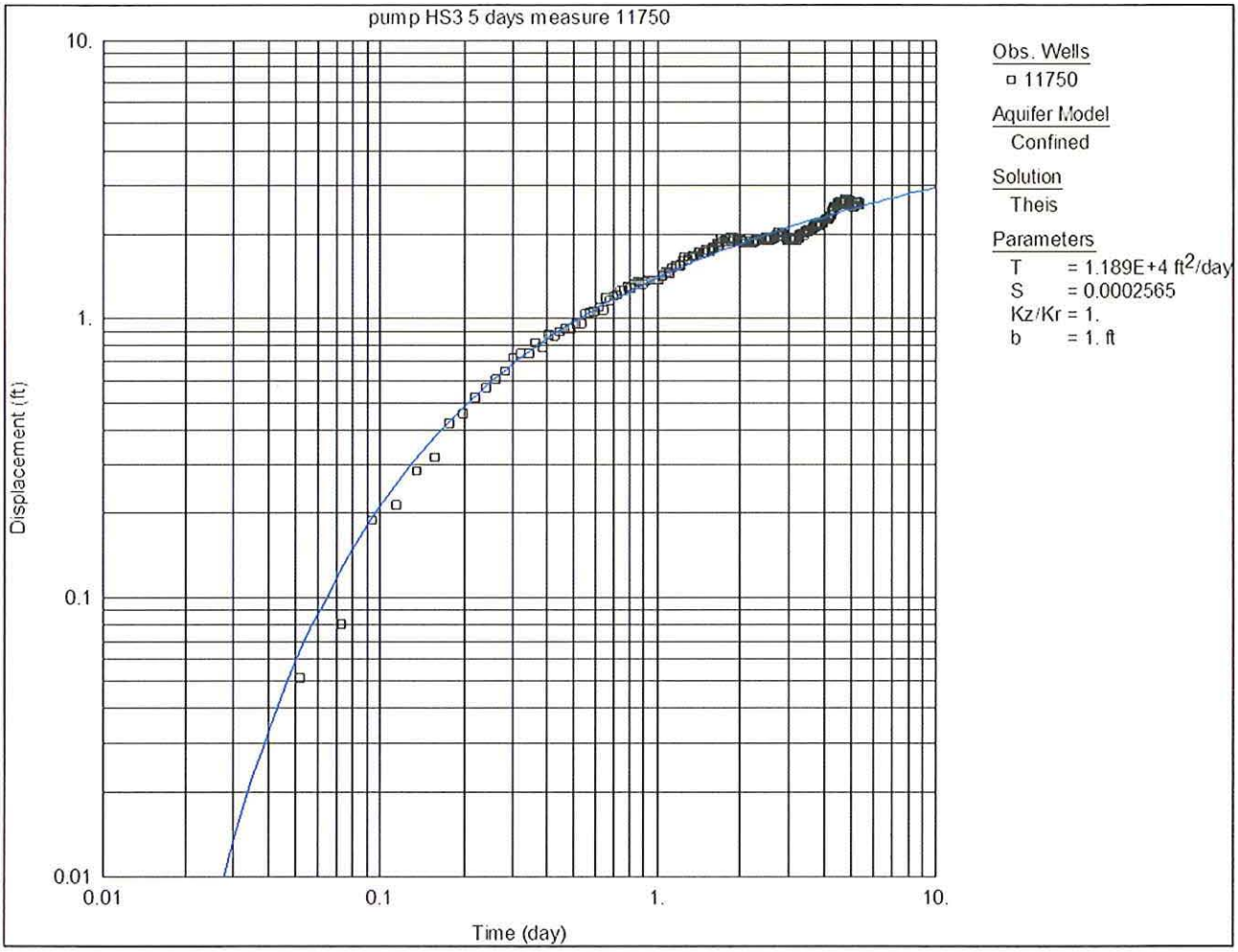
Attachment 7 – Analysis and results of water level change at well 25275 while well HS-003 pumping 536 gpm in October 2007. (Transmissivity 30,704 gpd/ft, Storativity 0.0001345, distance 1,635 feet, direction west)



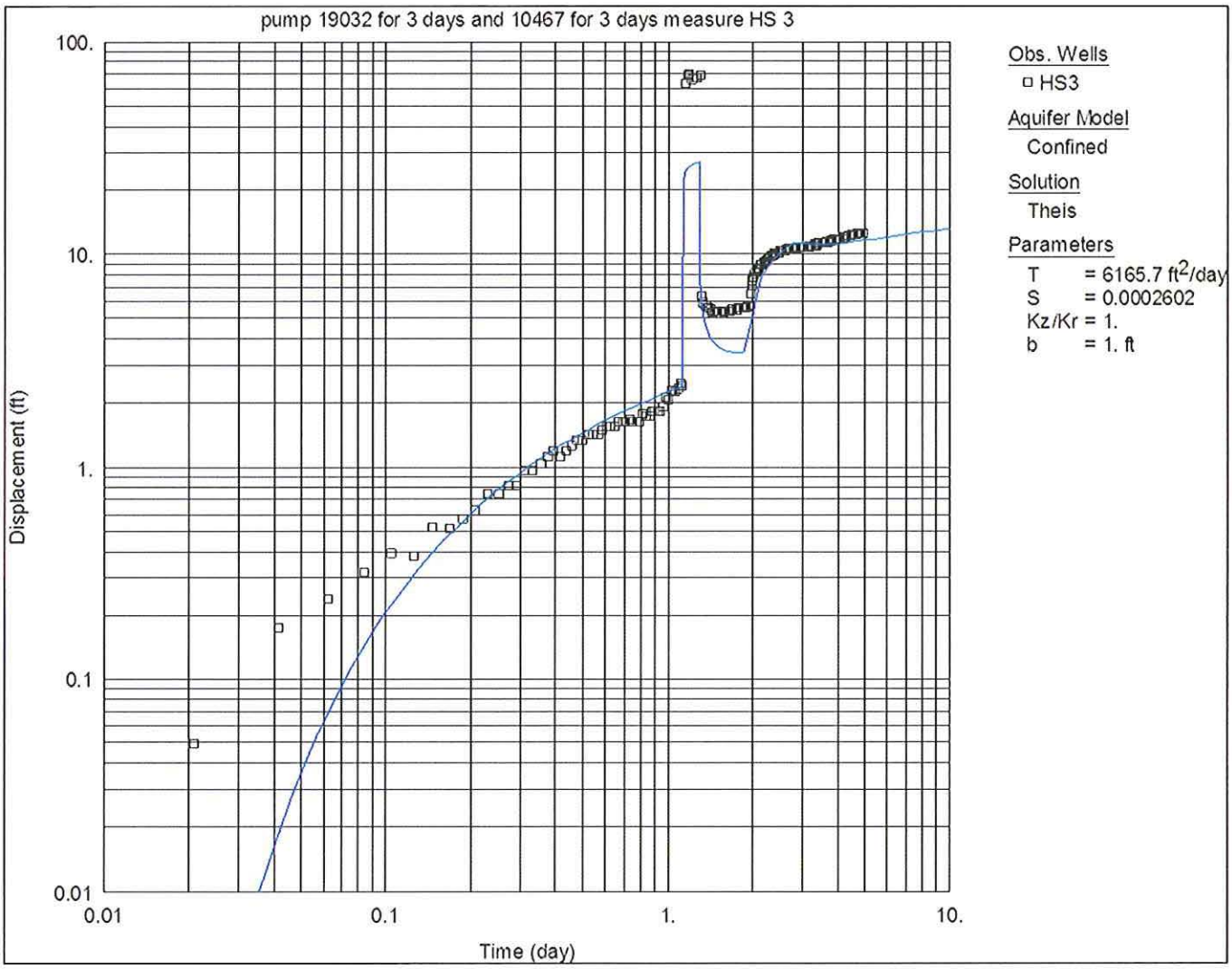
Attachment 8 – Analysis and results of water level change at well 19032 while well HS-003 pumping 536 gpm in October 2007. (Transmissivity 46,119 gpd/ft, Storativity 0.0002602, distance 3,422 feet, direction northeast)



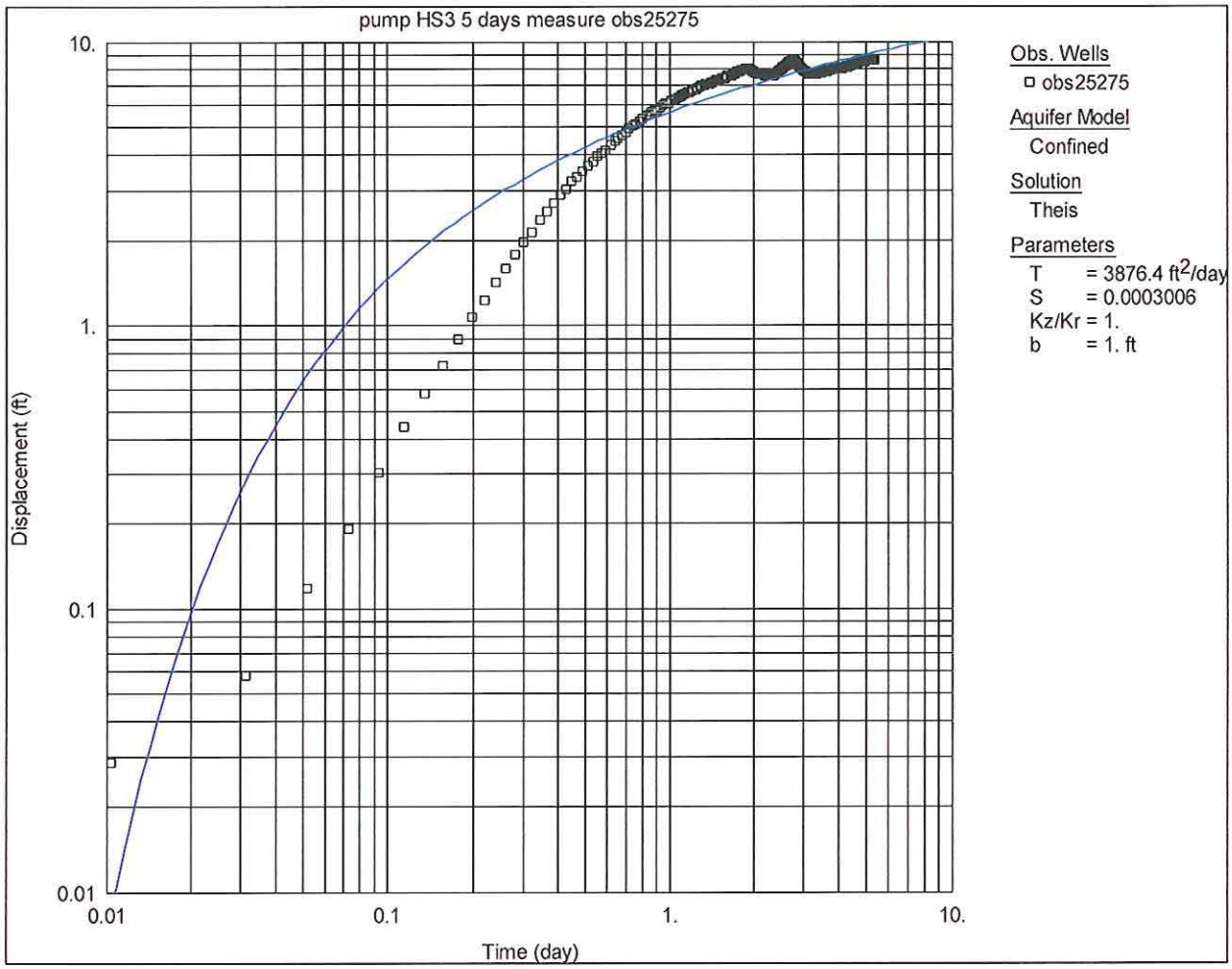
Attachment 9 – Analysis and results of water level change at well 11750 while well HS-003 pumping 536 gpm in October 2007. (Transmissivity 88,937 gpd/ft, Storativity 0.0002565, distance 3,865 feet, direction southeast)



Attachment 10 – Analysis results for October 2007 of Garetson well HS-003 and neighboring well 19032 located 3,422 feet northeast correlated with observed drawdown at well HS-003 in May 2007 when both well 19032 located 3,422 feet northeast and well 10467 located 1,427 feet east pumped. (Transmissivity 46,119 gpd/ft, Storativity 0.0002602)



Attachment 11 – Analysis and results of water level change at observation well located 1,459 feet west of well HS-003 while well HS-003 pumping 536 gpm in October 2007. (Transmissivity 28,995 gpd/ft, Storativity 0.0003006)



Attachment 12 - K.A.R. 5-4-1. Distribution of water between users when a prior right is being impaired.

In responding to a complaint that a prior water right is being impaired, the following procedure shall be followed:

(a) Complaint. The complaint shall be submitted in writing to the chief engineer or that person's authorized representative. The chief engineer shall take no action until the written complaint is submitted and, for non-domestic groundwater rights, the information specified in paragraph (b)(2) is provided.

(b) Investigation. The chief engineer shall investigate the physical conditions involved, according to the water rights involved in the complaint.

(1) If the water right is domestic, the chief engineer may require the complainant to provide a written report similar to that described in paragraph (b)(2).

(2) If the water right claimed to be impaired is not a domestic right and its source of water is groundwater, the complainant shall provide to the chief engineer a written report completed within 180 days preceding the date of the complaint. Within 30 days of the complainant's request, the chief engineer shall provide the complainant with data from the division of water resources that is relevant to preparation of the required report. The complainant's report shall meet the following requirements:

(A) Be prepared by a licensed well driller, a professional engineer, or a licensed geologist;

(B) describe the construction and the components of the well;

(C) provide data to show the extent to which the well has fully penetrated the productive portions of the aquifer with water of acceptable quality for the authorized use; and

(D) provide testing and inspection data to show the extent to which the pump and power unit are in good working condition to make full use of the available aquifer.

(3) In assessing the complainant's written report, the chief engineer may use all relevant data, including historical data from water well completion records, Kansas geological survey bulletins, and other data in the water right files.

(4) If the area of complaint is located within the boundaries of a groundwater management district (GMD), the chief engineer shall notify the GMD of the complaint before initiating the investigation and shall give the board of directors of the GMD the opportunity to assist with the investigation.

(5) If the source of water is groundwater, the chief engineer may require hydrologic testing to determine hydrological characteristics as part of the investigation. The chief engineer shall provide notice to water right owners in a geographic area sufficient to conduct the hydrologic testing and to determine who could be affected by the actions made necessary by the results of the investigation. These water right owners shall be known as the potentially affected parties. As part of the investigation, the chief engineer may require access to points of diversion or observation wells and may require the installation of observation wells.

(6) Data acquired during the investigation shall be provided to the complainant and any other persons notified for review and comment at their request as the investigation proceeds.

(c) Report. The chief engineer shall issue a report stating the relevant findings of the investigation.

(1) If the complainant's water right is a domestic water right or has surface water as its source and the complainant claims impairment by the diversion of water pursuant to surface

rights, the chief engineer shall provide a copy of the report to the complainant and to the potentially affected parties. This report shall constitute the final report of the investigation.

(2) If the complainant's water right is not a domestic right and has groundwater as its source or if the complainant's water right has surface water as its source and claims impairment by the diversion of water pursuant to groundwater rights, a copy of the report shall be provided by the division of water resources to the complainant and to the potentially affected parties. The report shall be posted by the division of water resources on the department of agriculture's web site. This report shall constitute the initial report of the investigation.

(A) If the initial report shows impairment, the potentially affected parties shall have the opportunity to submit written comments on the initial report within 30 days of its posting on the department's web site or a longer period if granted by the chief engineer. The chief engineer shall consider the written comments of the potentially affected parties.

(B) If the area of complaint is located within the boundaries of a GMD, the chief engineer shall provide a copy of the initial report to the GMD and shall consider any written comments submitted by the GMD board within 30 days of the posting of the initial report on the department's web site or a longer period if granted by the chief engineer.

(C) Nothing in this regulation shall prevent the chief engineer from regulating water uses that the chief engineer has determined are directly impairing senior water rights during the comment period or, if applicable, before obtaining written comments by the GMD board during the comment period.

(3) After reviewing comments on the initial report from potentially affected parties and, if applicable, from the GMD board, the chief engineer shall issue a final report, which shall be provided to the complainant, the potentially affected parties, and the GMD board if applicable and shall be posted on the department of agriculture's web site.

(4) The chief engineer may require conservation plans authorized by K.S.A. 82a-733, and amendments thereto, based on the initial and final reports.

(5) If the chief engineer's final report determines impairment and the source of water is a regional aquifer, the final report shall determine whether the impairment is substantially caused by a regional overall lowering of the water table. If the impairment is determined to be substantially caused by a regional overall lowering of the water table, no further action shall be taken under this regulation, and the procedure specified in K.A.R. 5-4-1a shall be followed.

(d) Request to secure water. If the complainant desires the chief engineer to regulate water rights that the final report has found to be impairing the complainant's water right, the complainant shall submit a written request to secure water to satisfy the complainant's prior right. The request to secure water shall be submitted on a prescribed form furnished by the division of water resources. The complainant shall specify the minimum reasonable rate needed to satisfy the water right and shall also provide information substantiating that need. The chief engineer shall determine how to regulate the impairing rights. Each request to secure water to satisfy irrigation-use water rights shall expire at the end of the calendar year in which the request was submitted.

(e) Notice of order.

(1) The chief engineer shall give a written notice and directive to those water right holders whose use of water must be curtailed to secure water to satisfy the complainant's prior rights.

(2) If the area of complaint is located within the boundaries of a GMD and if the final

report determines that the impairment is substantially due to direct interference, the chief engineer shall allow the GMD board to recommend how to regulate the impairing water rights to satisfy the impaired right.

(3) The chief engineer may consider regulating the impairing rights the next year and rotating water use among rights.

(4) All water delivered to the user's point of diversion for that individual's use at the specified rate or less shall be applied to the authorized beneficial use and shall count against the quantity of water specified unless the user notifies the chief engineer or authorized representative that diversion and use will be discontinued for a period of time for good reason.

(5) When the quantity of water needed has been delivered to the user's point of diversion or when the user discontinues that individual's use of water, those persons who have been directed to regulate their use shall be notified that they may resume the diversion and use of water.

(6) If the available water supply in the source increases, the chief engineer may allow some or all of the regulated users to resume use, depending on the supply. (Authorized by and implementing K.S.A. 82a-706a; modified, L. 1978, ch. 460, May 1, 1978; amended Oct. 29, 2010.)

Attachment 13

Vested Right, File No. HS-003								
Date	Document	Quantity (AF)	Rate	Rate Unit	Point of Diversion	Place of Use	Authorized Acres	Explanation
10/21/1948	Information Submitted	240	1.34	cfs	NW NE 36-27-31W	80 ac N1/2, 40 ac SW1/4, 25 ac SENE, 15 ac NENW 36-27-31W	160	Information Submitted to Aid in Determination of a Vested Right to the Beneficial Use of Water. Signed by Warren Moore, operator, claiming right for use begun in 1940 by Dale Moore.
9/12/1950	Order of Chief Engineer	240	1.34	cfs	NW NE 36-27-31W	80 ac N1/2, 40 ac SW1/4, 25 ac SENE, 15 ac NENW 36-27-31W	160	Notice of Contents of Order Determing and Establishing Vested Rights to Continue the Beneficial Use of Water; note 1.34 cfs is about 601 gpm.
6/3/1959	Letter of Chief Engineer							Letter confirms that Warren Moore is now the owner of the land appurtenant to the vested right.
6/23/1959	Application for Change							Change application proposes to change the place of use under the vested right to the E1/2 and the E1/2 of the W1/2 of 36-27-

				31W, 480 acres.
7/31/1959	Order of Chief Engineer	E1/2 and the E1/2 of the W1/2 of 36-27-31W	480	Change application approved. In all other respects the determined vested right is as stated and set forth in the order of 9/12/1950.
9/7/1976	Application for Change			Change application proposes to change the point of diversion to the NWNWNE 36-27-31W. Also shows Warren Moore as owner of 80 ac E1/2SW1/4 and 160 ac SE1/4, and Donald F. Moore and Roy Dale Moore as owners of 160 ac NE1/4 and 80 ac E1/2NW1/4, all in 36-27-31W.
4/8/1977	Letter from DWR to Obed Koehn			Letter advises Mr. Koehn that the Moores have filed an application to change the point of diversion under the vested right and allows Mr. Koehn 30 days to

			provide comments or other information. Copy of aerial photo in application shows Obed Koehn as the owner of a well near the center of the S1/2SW1/4 25-27-31W. No record of any information submitted by Mr. Koehn.
4/21/1977	Letter from GMD3		Letter recommends approval of change as it is consistent with GMD well spacing policy.
7/8/1977	Order of Chief Engineer	NWNWNE 36-27-31W	Finds that proposed change is reasonable and will not impair existing rights and relates to the same local source of supply. In all other respects the determined vested right is as stated and set forth in the order of 9/12/1950, as amended by the order of the Chief Engineer on 7/31/1959.

6/28/1979	Application for Change	Change application proposes to change the place of use under the vested right to the 160 ac NE1/4, 40 ac NENW, 10 ac NWNW, 35 ac SESW, owned by Garetson Brothers; 80 ac E1/2SW1/4, 160 ac SE1/4, owned by Warren Moore; 18 ac NWNW, owned by Donald F. and Roy Dale Moore, all in 35-27-31W.
8/13/1979	Letter from GMD3	Letter recommends approval of change subject to the installation and use of a consumptive water meter.

2/15/1980	Order of Chief Engineer		160 ac NE1/4, 40 ac NENW, 10 ac NWNW, 35 ac SESW,80 ac E1/2SW1/4, 160 ac SE1/4, 18 ac NWNW, all in 35-27-31W	503	Finds that proposed change is reasonable and will not impair existing rights and relates to the same local source of supply. In all other respects the determined vested right is as stated and set forth in the order of 9/12/1950, as amended by the orders of the Chief Engineer on 7/31/1959 and 7/8/1977. Order also requires installation of an acceptable water meter, maintaining the same in an operating condition satisfactory to the Chief Engineer, maintenance of records from with total quantity of water diverted each month of each calendar year may be readily determined, and to furnish such

		records upon request of the Chief Engineer.
2/15/1980	Letter transmitting order	Letter requires owners that until further notice, to report by the 10th day of each month beginning the month following the month in which the meter is installed the actual quantity of water diverted during the preceeding month.
3/29/2002	Application for Change	Change application proposes to change the place of use under the vested right to the 160 ac NE1/4, 40 ac NENW, 10 ac NWNW, 32 ac SESW, owned by

				Garetson Brothers; 18 ac NWNW, 40 ac NESW, 31 ac NWSW, 13 ac SWSW, 40 ac SESW, 40 ac NESE, 40 ac NWSE, 36 ac SWSE, 12.6 ac SESE, owned by Gay Beth Moore, all in 35-27-31W.
6/7/2002	Summary Order of duly authorized designee of the Chief Engineer	160 ac NE1/4, 40 ac NENW, 10 ac NWNW, 32 ac SESW, 18 ac NWNW, 40 ac NESW, 31 ac NWSW, 13 ac SWSW, 40 ac SESW, 40 ac NESE, 40 ac NWSE, 36 ac SWSE, 12.6 ac SESE, all in 35-27-31W	508.6	Change approval states that all terms, conditions and limitations applicable to this water right, not expressly changed or removed, by the issuance of this change approval remain in full force and effect. If a request for hearing in accordance with K.A.R. 5-14-3 is not filed within 15 days of the issuance of the summary order, or the order shall become final.
3/9/2005	Letter from Garetson Brothers			Letter to Mike Meyer, Water Commissioner, complains that two

			nearby wells, File Nos. 10467 and 25275 have impaired vested water right HS-003.
3/30/2005	Application for Change		Change application proposes to change the point of diversion to the NENENW 36-27-31W.
5/26/2005	Letter from Thomas L. Huntzinger, Water Appropriations Program Manager		Letter to Garetson Brothers indicates DWR's intent to conduct a formal investigation to define the effects of other wells on Garetson Brothers' wells.
3/20/2006	Summary Order of duly authorized designee of the Chief Engineer	NWNWNE 36-27-31W	Change approval states that with the exception of those conditions expressly contained in the approval, the Summary Order does not change the terms, conditions and limitations of File No. HS-003. A condition of the approval states that the change shall not

		impair existing rights and shall be limited to the same local source or sources of water as previously authorized. If a request for hearing in accordance with K.A.R. 5-14-3 is not filed within 15 days of the issuance of the summary order, or the order shall become final.
2/22/2007	Letter from Garetson Brothers	Letter to Michael A. Meyer, Water Commissioner formally withdraws the impairment petition. It states, "Rather than being a positive catalyst for change in the effort to extend the useful life of the aquifer as a whole we have been perceived as selfishly damagin our neighbors for our own gain. If the final result of the impairment action were implemented

		only on the junior wells in the immediate vicinity of HS#003 while the status quo of rapid depletion was allowed to continue unaddressed in the rest of GMD #3, then those inaccurate perceptions of our family's intentions would become "proven" in the eyes of our friends and neighbors."
3/20/2007	Letter from Lane P. Letourneau, Program Manager, Water Appropriation Program	Letter to Garetson Brothers acknowledges receipt of the formal withdrawal of the impairment petition and indicates DWR will no longer pursue the investigation as an impairment investigation as outlined in K.A.R. 5-4-1. Letter also indicates that DWR will continue monitoring the area and record data.

Attachment 14

Water Right, File No. 10467								
Date	**Document**	**Quantity (AF)**	**Rate**	**Rate Unit**	**Point of Diversion**	**Place of Use**	**Authorized Acres**	**Explanation**
11/12/1964	Application for Permit	430	1500	gpm	SESE 25-27-31W	30 ac NENE, 20 ac SENE, 5ac NESW, 38 ac SESW, 30 ac NESE, 12 ac NWSE, 40 ac SWSE, 40 ac SESE, all in 25-27-31W.	215	Filed by Suse Koehn. All land owned by Susie Koehn.
2/18/1965	Approval of Application	424	1500	gpm	NCS1/2S1/2SE1/4 25-27-31W.	23 ac NENE, 19 ac SENE, 4ac NESW, 1 ac SWSE, 34 ac SESW, 33 ac NESE, 18 ac NWSE, 40 ac SWSE, 40 ac SESE, all	212	Application was modified by Marvin Koehn for Susie Koehn from original prior to approval. All land owned by Susie D. Koehn

						in 25-27-31W.		
11/17/1980	Application for Change							Change application proposes to change the place of use to 80 ac E1/2SW, 33 ac NESE, 18 ac NWSE, 80 ac S1/2SE, all in 25-27-31W. Application signed by Dave F. Koehn, Power of Attorney for multiple landowners.
6/29/1981	Approval of Change					80 ac E1/2SW, 33 ac NESE, 18 ac NWSE, 80 ac S1/2SE, all in 25-27-31W.	211	In all other respects, the Approval of Application, File No. 10467 is as stated and set forth in the approval dated 2/18/1965.
8/17/1982	Certificate of Appropriation	424	1000	gpm	150 ft N and 1250 ft W (NCS1/2S1/2SE1/4) 25-27-31W.	80 ac E1/2SW, 33 ac NESE, 18 ac NWSE, 80 ac S1/2SE, all in 25-27-31W.	211	Priority Date 11/12/1964

3/7/1994	Application for Change		Change application proposes to change the point of diversion to 109 ft N and 1443 ft W (SESWSE) 25-27-31W. Signed by Charles Koehn and Osi Marie Koehn. Landowner shown as Charles Koehn and Osie Marie Koehn.
3/11/1994	Approval of Change	109 ft N and 1443 ft W (SESWSW) 25-27-31W	
9/1/1993	Trustee's Deed		Shows Donald F. and Lois A. Nightengale as owners of land covered by File No. 10467.
5/17/1994	Letter from DWR		Letter to Donald F. and Lois A. Nightengale acknowledging receipt of trustee's deed and informing them that DWR's records have been changed to them as owners of land covered by File No. 10467.

6/30/1994	Application for Change			Change application proposes to add 80 ac W1/2SW 25-27-31W, owned by Charles and Marla Koehn. Application also proposes to change remaining land to160 ac SW1/4, 33 ac NESE, 32 ac NWSE, 33 ac SWSE, 33 ac SWSE, all in 25-27-31W. Indicates that Donald F. and Lois Nightengale, and Osie Marie Koehn, Trustee of Dave F. Koehn Trust, as owners of that land.
12/7/1994	Approval of Change	160 ac SW1/4, 33 ac NESE, 32 ac NWSE, 33 ac SWSE, 33 ac SWSE, all in 25-27-31W.	291	In all other respects, the Certificate of Appropriation is as set forth 8/17/1982.
11/8/2007	Application for Change			Change application proposes to change the place of use to 40 ac NESW, 38 ac NWSW, 15 ac SWSW, 38 ac SESW, 160 ac SE1/4, all in 25-27-31W. Shows all land owned by Donald F. and

				Lois A. Nightengale Rev. Trust, Gary Nightengale, Trustee.
1/23/2008	Summary Order of duly authorized designee of the Chief Engineer	40 ac NESW, 38 ac NWSW, 15 ac SWSW, 38 ac SESW, 160 ac SE1/4, all in 25-27-31W.	291	Change approval states that all terms, conditions and limitations applicable to this water right, not expressly changed or removed, by the issuance of this change approval remain in full force and effect. If a request for hearing in accordance with K.A.R. 5-14-3 is not filed within 15 days of the issuance of the summary order, or the order shall become final.
9/4/2012	Warranty Deed			Deed shows Kelly Unruh and Diana Unruh, h/w, convey all land and water rights in S1/2 25-27-31W to American Warrior, Inc., c/o Mike O'Brate. Note: There is nothing in the file which shows ownership change from the Nightengale Trust to the Unruhs.

Attachment 15

Water Right, File No. 25275								
Date	**Document**	**Quantity (AF)**	**Rate**	**Rate Unit**	**Point of Diversion**	**Place of Use**	**Authorized Acres**	**Explanation**
12/24/1975	Application for Permit	160	1200	gpm	SESWSW 25-27-31W	80 ac W1/2 SW1/4 25-27-31W	80	Filed by Obed Koehn. Land owned by Obed Koehn.
7/27/1976	Letter from DWR to Donald F. Moore							Letter advises Mr. Moore that Obed Koehn has filed an application for permit to appropriate water and allows Mr. Moore 30 days to provide comments or other information. No record of any information submitted by Mr. Moore.
10/8/1976	Approval of Application	160	1200	gpm	SESWSW 25-27-31W	80 ac W1/2 SW1/4 25-27-31W	80	
2/26/1982	1980 Water Use Report							Received in Garden City Field Office. Indicates that Stanley A. Smith is now the owner.
4/12/1985	Letter from DWR to Charles Koehn							Letter indicates that DWR has been informed by Stanley Smith that Charles Koehn is now the

								owner of the land covered by the application.
10/2/1986	Letter from DWR to Charles R. and Marla J. Koehn							Letter indicates that information on file in DWR shows Charles R. and Marla J. Koehn (h/w) as owners of the land covered by the application.
11/26/1986	Certificate of Appropriation	160	1200	gpm	60 ft North and 4000 ft W (NC South Side SW1/4) 25-27-31W.	80 ac W1/2 SW1/4 25-27-31W	80	Priority Date 12/14/1975. Description of location of original existing well changed.
6/30/1994	Application for Change							Change application proposes to add 80 ac E1/2 SW1/4, 33 ac NESE, 32 ac NWSE, 33 ac SWSE, 33 ac SWSE, all in 25-27-31W. Indicates that Donald F. and Lois Nightengale, and Osie Marie Koehn, Trustee of Dave F. Koehn Trust, as owners of that land.
12/7/1994	Approval of Change					160 ac SW1/4, 33 ac NESE, 32 ac NWSE, 33 ac	291	In all other respects, the Certificate of Appropriation is as set forth 11/26/1986.

		SWSE, 33 ac SWSE, all in 25-27-31W.	
2/9/2005	Trustee's Deed		Received in DWR on 3/23/2006, shows Donald F. Nightengale Revocable Trust as owner of W1/2 SW1/4 25-27-31W.
11/4/2005	Application for Change		Application proposes to change the point of diversion to 120 ft North and 4560 ft West (SESWSW) 25-27-31W.
11/4/2005	Letter from DWR to Garetson Brothers		Letter advises that Nightengale Estate has filed an application for approval to change the point of diversion under File No. 25275. Indicates Garetson Brother have submited comments on the water situation in the area in the recent past and gives 30 days to submit any additional information.

3/20/2006	Summary Order of duly authorized designee of the Chief Engineer	120 ft North and 4560 ft West (SESWSW) 25-27-31W	Change approval states that all terms, conditions and limitations applicable to this water right, not expressly changed or removed, by the issuance of this change approval remain in full force and effect. If a request for hearing in accordance with K.A.R. 5-14-3 is not filed within 15 days of the issuance of the summary order, or the order shall become final. Change approval also required installation and maintenance of two observation wells according to specifications set forth in the approval.
11/8/2007	Application for Change		Change application proposes to change the place of use to 40 ac NESW, 38 ac NWSW, 15 ac SWSW, 38 ac SESW, 160 ac SE1/4, all in 25-27-31W. Shows all land owned

				by Donald F. and Lois A. Nightengale Rev. Trust, Gary Nightengale, Trustee.
1/23/2008	Summary Order of duly authorized designee of the Chief Engineer	40 ac NESW, 38 ac NWSW, 15 ac SWSW, 38 ac SESW, 160 ac SE1/4, all in 25-27-31W.	291	Change approval states that all terms, conditions and limitations applicable to this water right, not expressly changed or removed, by the issuance of this change approval remain in full force and effect. If a request for hearing in accordance with K.A.R. 5-14-3 is not filed within 15 days of the issuance of the summary order, or the order shall become final.
9/4/2012	Warranty Deed			Deed shows Kelly Unruh and Diana Unruh, h/w, convey all land and water rights in S1/2 25-27-31W to American Warrior, Inc., c/o Mike O'Brate. Note: There is nothing in the file which shows ownership change from

	the Nightengale Trust to the Unruhs.

In 2015 and 2016, the highest annual water levels continued to decline similarly to the linear relationship observed (Figure 7 in the Initial Report – Attachment C) between the cumulative volumes of water pumped from Neighborhood wells. See Figure 1 below.

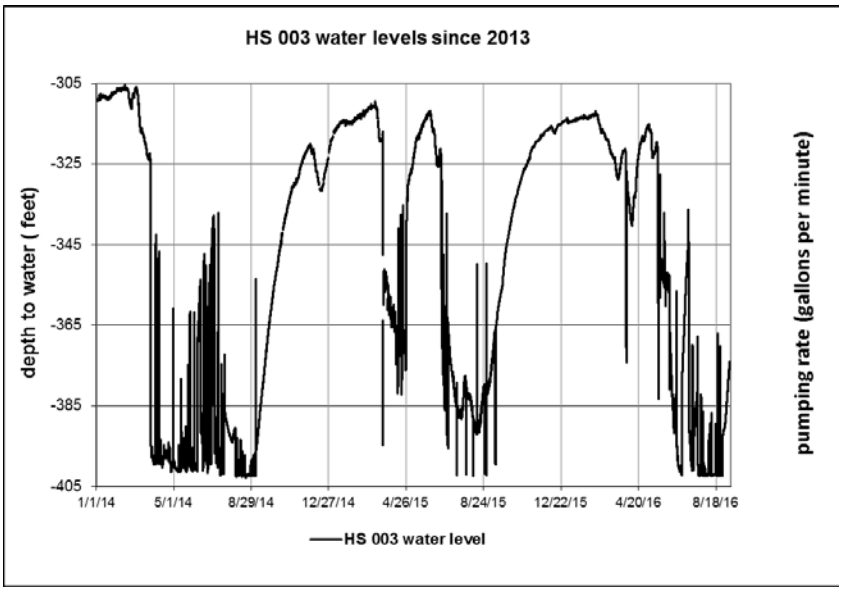


Figure 1 – Monitored water levels at HS 003 since 2013.

The total amount of water pumped from the six Neighborhood wells in 2014 was 1,048 acre-feet and in 2015 the total was 420 acre-feet. Based on the linear relationship between the total cumulative volume of water pumped from 2009 and the highest depth to water observed the year after the previous pumping season the highest depths to water were estimated for 2015 and 2016. The highest depth to water at HS 003 was estimated to be about 312 feet to water in 2015 and about 314 feet to water in 2016. The highest water level measured for a period in 2015 was about 310 feet to water and the highest water level measured for a period in 2016 was about 312 feet. Table 1

	total water pumped per year	cumulative water pumped	pre-season depth to water estimated (feet) observation well			Post 2013 highest depth to water observed for periods after the previous year irrigation	
year	acre-ft	acre-ft	year	obs 25275	irrigation well HS003	well HS003	date
2009	1000.684	1000.684167	2010	-251.88	-275.88		
2010	1174.123	2174.807245	2011	-259.05	-283.05		
2011	1394.738	3569.5448	2012	-267.55	-291.55		
2012	1312.948	4882.492587	2013	-275.56	-299.56		
2013	1014.474	5896.966587	2014	-281.75	-305.75	-305.98	2/12/2014
2014	1048.229	6945.195587	2015	-288.15	-312.15	-310.50	3/9/2015
2015	420.186	7365.381587	2016	-290.71	-314.71	-312.52	2/13/2016

Table 1 – Estimated pre-season depths to water and highest water levels observed for periods the following year.