

GAM run 05-10

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Texas Water Development Board
Groundwater Availability Modeling Section
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REQUESTOR:

Mr. Stefan Schuster with Freese and Nichols, Inc. on behalf of the Panhandle Regional Water Planning Group

DESCRIPTION OF REQUEST:

Mr. Schuster requested that we compare the groundwater volumes between GAM Run 04-13 (Smith, 2004) and GAM Run 05-09 (Smith, 2005). GAM Run 04-13 involved calculating the groundwater in storage in the Ogallala aquifer for each county-basin area in the Panhandle Regional Water Planning Area assuming a 1.25 percent annual depletion from the base year of 1998 from 2000 through 2060 with average recharge (1.25% analysis). GAM Run 05-09 involved running the Groundwater Availability Model (GAM) for the northern part of the Ogallala aquifer from 2000 to 2060 using estimates of groundwater demands from the Panhandle Regional Water Planning Group for their 2006 regional water plan (GAM run).

METHODS:

We extracted the volumes from the 1.25% analysis and the GAM run and created a table to compare the numbers.

PARAMETERS AND ASSUMPTIONS:

- See GAM Run 04-13 and GAM Run 05-09 for the parameters and assumptions used in the source data for this analysis.

RESULTS:

Table 1 shows the groundwater volumes from the 1.25% analysis and the GAM run for the appropriate counties in the Panhandle Regional Water Planning Area. The volumes between the 1.25% analysis and the GAM run are similar for all but two counties in 2000. These volumes should be similar since the 1.25% analysis and the GAM run start with the same aquifer conditions. The volumes for Oldham and Randall counties do not agree because the GAM run does not include the entire county whereas the 1.25% analysis does.

After 2000, the volumes between the 1.25% analysis and the GAM run diverge. This is because the 1.25% analysis assumes that pumping will equal 1.25 percent of the current volume while the GAM run is based on actual projected demands.

The table can be used to see if the projected demands as expressed in the GAM violate the 1.25% analysis. This happens if the volume projected by the GAM is less than the volume projected by the 1.25% analysis. This occurs in Armstrong County (2000), Dallam County (2000 to 2060), Moore County (2010 to 2060), and Sherman County (2020 to 2060). The violation in Armstrong County can probably be disregarded because the difference only shows up in 2000 and is probably due to differences in starting volumes in the analysis. Note that the GAM run may include less pumpage than initially assigned because the aquifer cannot support the pumpage and begins to go dry. This occurs in Dallam, Moore, and Sherman counties as well as others (see GAM Run 05-09).

REFERENCES:

- Smith, R., 2004, GAM Run 04-13: Texas Water Development Board, 7 p.
Smith, R., 2005, GAM Run 05-09: Texas Water Development Board, 14 p.

Table 1. Comparison between volumes of remaining groundwater using the 1.25% concept and using the GAM.

County	1.25% 2000 (acre-feet)	GAM 2000 (acre-feet)	1.25% 2010 (acre-feet)	GAM 2010 (acre-feet)	1.25% 2020 (acre-feet)	GAM 2020 (acre-feet)	1.25% 2030 (acre-feet)	GAM 2030 (acre-feet)	1.25% 2040 (acre-feet)	GAM 2040 (acre-feet)
Armstrong	<u>3,680,000</u>	<u>3,610,000</u>	3,290,000	3,540,000	2,950,000	3,480,000	2,650,000	3,420,000	2,380,000	3,370,000
Carson	13,300,000	13,500,000	11,800,000	12,500,000	10,500,000	11,600,000	9,360,000	10,700,000	8,330,000	9,980,000
Collingsworth	72,700	74,000	66,500	73,900	61,000	73,800	56,200	73,700	51,900	73,600
Dallam	<u>15,500,000</u>	<u>14,700,000</u>	13,800,000	12,300,000	12,400,000	10,300,000	11,200,000	9,090,000	10,000,000	7,790,000
Donley	5,200,000	5,290,000	4,720,000	5,130,000	4,300,000	4,990,000	3,930,000	4,860,000	3,600,000	4,740,000
Gray	11,200,000	11,400,000	10,000,000	11,100,000	9,010,000	10,800,000	8,100,000	10,500,000	7,300,000	10,300,000
Hansford	18,200,000	18,500,000	16,200,000	17,300,000	14,300,000	16,200,000	12,700,000	15,200,000	11,300,000	14,200,000
Hartley	20,300,000	20,500,000	18,100,000	18,300,000	16,100,000	16,300,000	14,300,000	14,700,000	12,800,000	13,600,000
Hemphill	13,300,000	13,700,000	12,000,000	13,700,000	10,900,000	13,600,000	9,890,000	13,600,000	9,020,000	13,500,000
Hutchinson	9,480,000	9,590,000	8,510,000	8,900,000	7,650,000	8,220,000	6,890,000	7,610,000	6,230,000	7,080,000
Lipscomb	18,300,000	18,600,000	16,300,000	18,500,000	14,600,000	18,400,000	13,000,000	18,300,000	11,700,000	18,200,000
Moore	10,500,000	10,500,000	<u>9,370,000</u>	<u>8,750,000</u>	<u>8,340,000</u>	<u>7,060,000</u>	<u>7,420,000</u>	<u>5,560,000</u>	<u>6,620,000</u>	<u>4,400,000</u>
Ochiltree	18,700,000	19,100,000	16,600,000	18,200,000	14,700,000	17,400,000	13,000,000	16,600,000	11,600,000	15,900,000
Oldham*	2,580,000	444,000	2,310,000	436,000	2,080,000	431,000	1,870,000	425,000	1,690,000	419,000
Potter	2,790,000	2,790,000	2,490,000	2,680,000	2,230,000	2,530,000	2,000,000	2,410,000	1,800,000	2,340,000
Randall*	6,230,000	1,560,000	5,730,000	1,450,000	5,290,000	1,360,000	4,900,000	1,280,000	4,560,000	1,220,000
Roberts	23,400,000	23,900,000	20,800,000	23,400,000	18,600,000	22,800,000	16,600,000	22,300,000	14,900,000	21,900,000
Sherman	16,600,000	17,300,000	14,700,000	15,000,000	<u>13,000,000</u>	<u>12,700,000</u>	<u>11,600,000</u>	<u>10,100,000</u>	<u>10,300,000</u>	<u>8,590,000</u>
Wheeler	6,540,000	6,650,000	6,000,000	6,600,000	5,520,000	6,550,000	5,090,000	6,510,000	4,720,000	6,480,000

* - The GAM numbers for Oldham and Randall counties do not include the entire county while to 1.25% analysis numbers do. The GAM numbers only include the parts of the counties that are included in the GAM for the northern part of the Ogallala aquifer.

- Volumes that are underlined represent cases where the volume from the GAM run is less than the volume from the 1.25% analysis.

- Values are rounded to three significant figures.

Table 1. Continued.

County	1.25% 2050 (acre-feet)	GAM 2050 (acre-feet)	1.25% 2060 (acre-feet)	GAM 2060 (acre-feet)
Armstrong	2,140,000	3,320,000	1,930,000	3,280,000
Carson	7,420,000	9,320,000	6,620,000	8,730,000
Collingsworth	48,200	73,500	44,900	73,400
Dallam	9,050,000	6,890,000	8,190,000	6,210,000
Donley	3,310,000	4,650,000	3,050,000	4,570,000
Gray	6,600,000	10,000,000	5,970,000	9,810,000
Hansford	10,000,000	13,300,000	8,900,000	12,500,000
Hartley	11,500,000	13,000,000	10,300,000	12,500,000
Hemphill	8,250,000	13,500,000	7,570,000	13,500,000
Hutchinson	5,640,000	6,660,000	5,130,000	6,310,000
Lipscomb	10,500,000	18,100,000	9,450,000	18,000,000
Moore	5,910,000	3,570,000	5,280,000	2,970,000
Ochiltree	10,300,000	15,300,000	9,160,000	14,700,000
Oldham*	1,530,000	415,000	1,390,000	411,000
Potter	1,620,000	2,260,000	1,460,000	2,190,000
Randall*	4,250,000	1,170,000	3,990,000	1,130,000
Roberts	13,400,000	21,400,000	12,000,000	20,800,000
Sherman	9,120,000	7,040,000	8,120,000	5,490,000
Wheeler	4,390,000	6,450,000	4,100,000	6,430,000