

IV. PROJECTED DEMAND FOR POTABLE WATER

A. Historical Water Usage

In order to evaluate trends in water usage, Monett's water use data was tabulated for the last five years, reflecting monthly volumes of water pumped into the distribution system from the wells, and metered water sales to customers. Daily water pumpage was also evaluated to determine peak-to-average day ratios for each month. The tabulation of water pumped to the system during this five-year period is set forth in Appendix "C". Monthly water sales data for the same time period is provided in Appendix "D", and annual water sales data is set forth in Appendix "E". Water sales data is listed by user class to facilitate projections of future water system demands.

Historical water pumpage is compared with water sales by user class in Figures 4A and 4B. Each figure displays a two-year time period, covering the four years from January 2004 through December 2007. The annual amounts of water pumped and sold during the last four years is summarized as follows:

<u>Calendar Year</u>	<u>Total MGAL to System</u>	<u>Total MGAL Water Sales</u>
2004	1083	962
2005	1097	997
2006	1244	986
2007	1176	1010

In evaluating the adequacy of facilities, consideration must be given to the demands placed on the system during periods of peak water usage. Monett must provide for normal weekday demands that are greater than "average" demands, due to the significant weekday water use by industries. While "average" daily pumpage during 2007 equaled 3,222,000 gallons, weekday pumpage averaged nearer 3,700,000 gallons per day

A graphical comparison of water pumpage and sales with peak day pumpage from years 2004 through 2007 is shown in Figures 5A and 5B.

Figure 4A
Water Pumpage and Sales
(1/04 thru 1/06)

- Total Water Pumped to Distribution System
- Municipal Water Usage
- ▲— Industrial Water Sales
- ◆— Commercial Water Sales
- Residential Water Sales
- Known Loss
- +— Total Water Sales

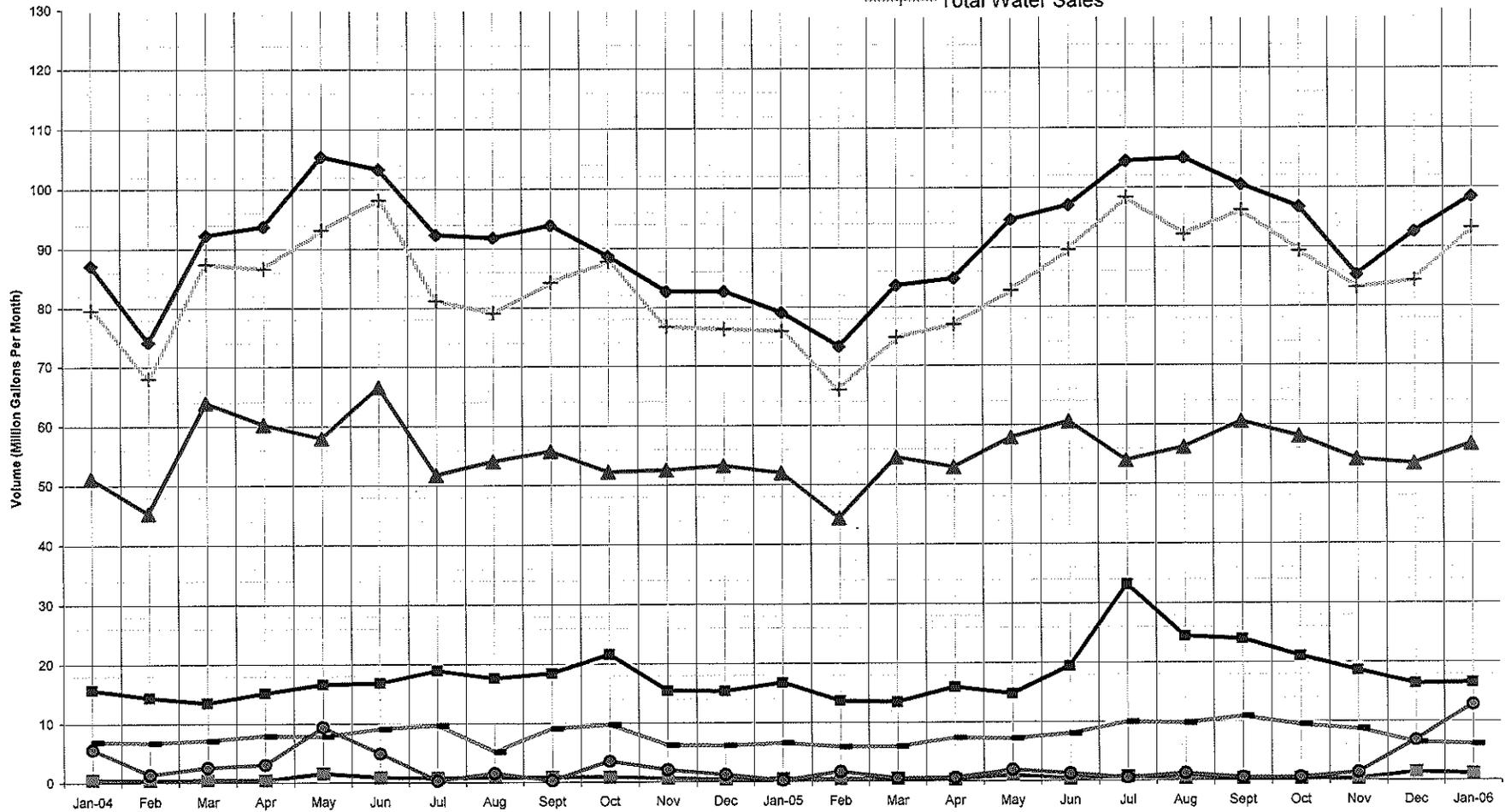


Figure 4B
Water Pumpage and Sales
(1/06 thru 1/08)

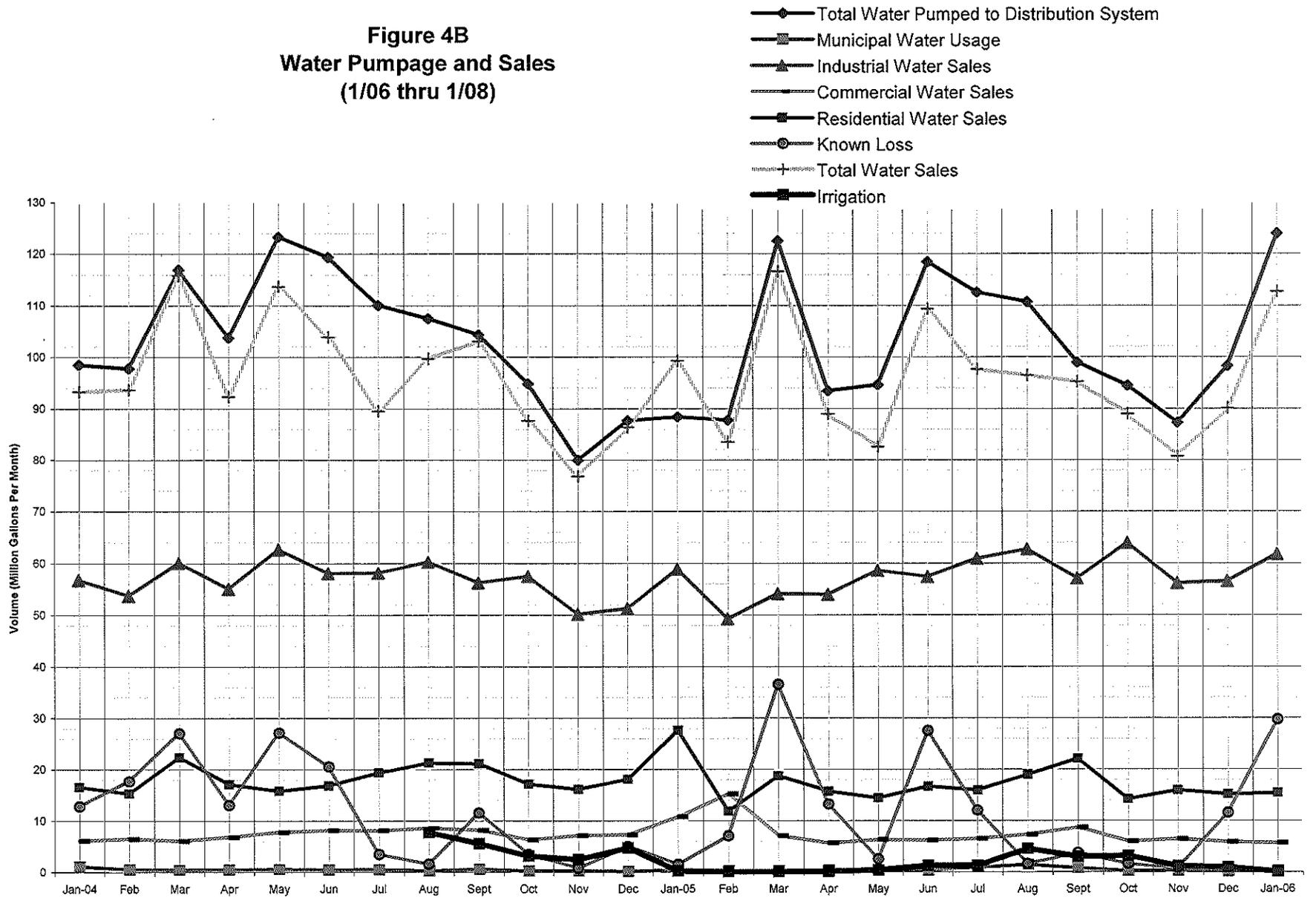


Figure 5A
Water Pumpage and Usage Vs. Peak Day Pumpage
(01/04 thru 01/06)

- ◆ Average Day Pumpage To System (GPD)
- Peak Day Pumpage To System (GPD)
- ▲ Average Day Metered Water Usage (GPD)

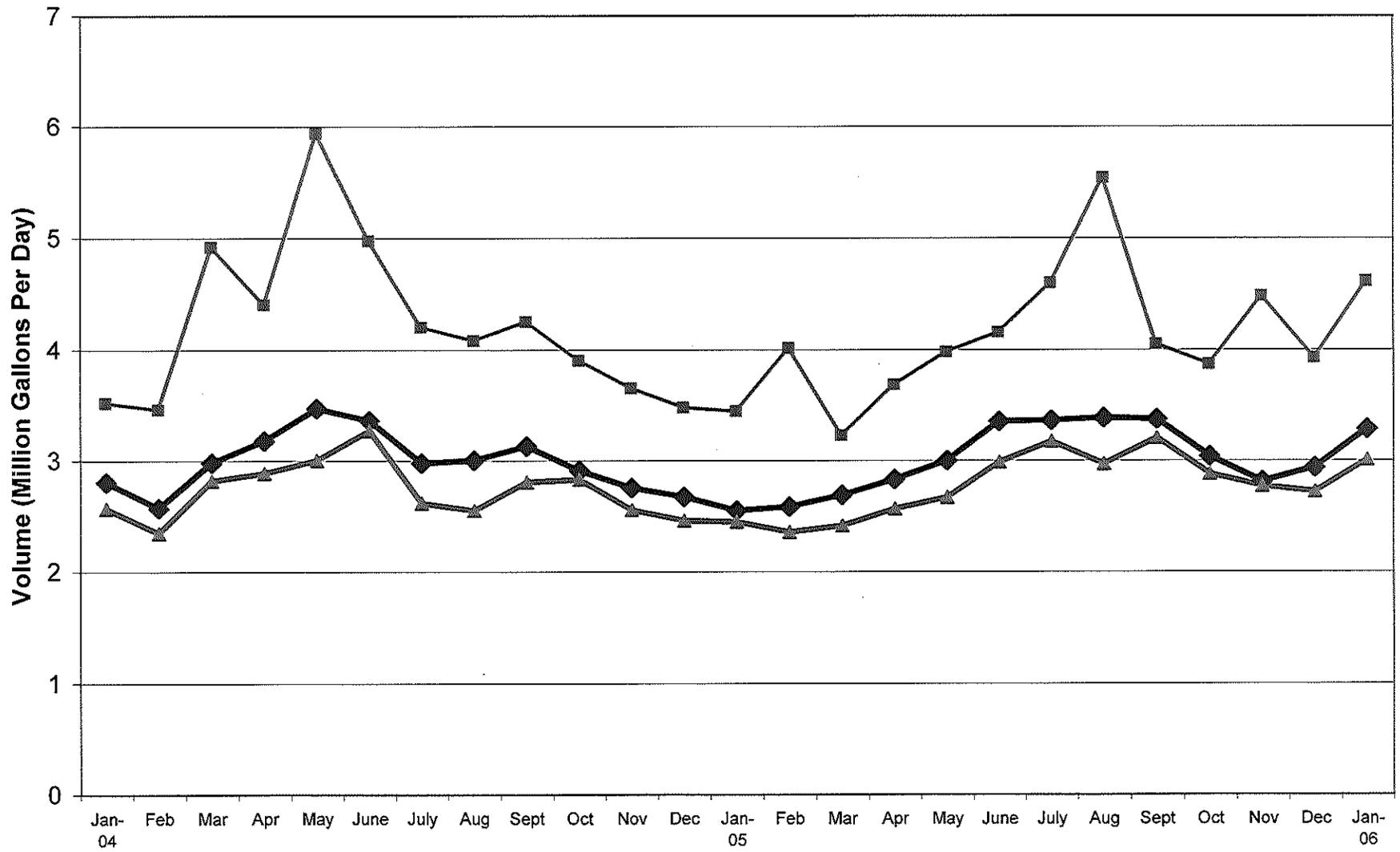
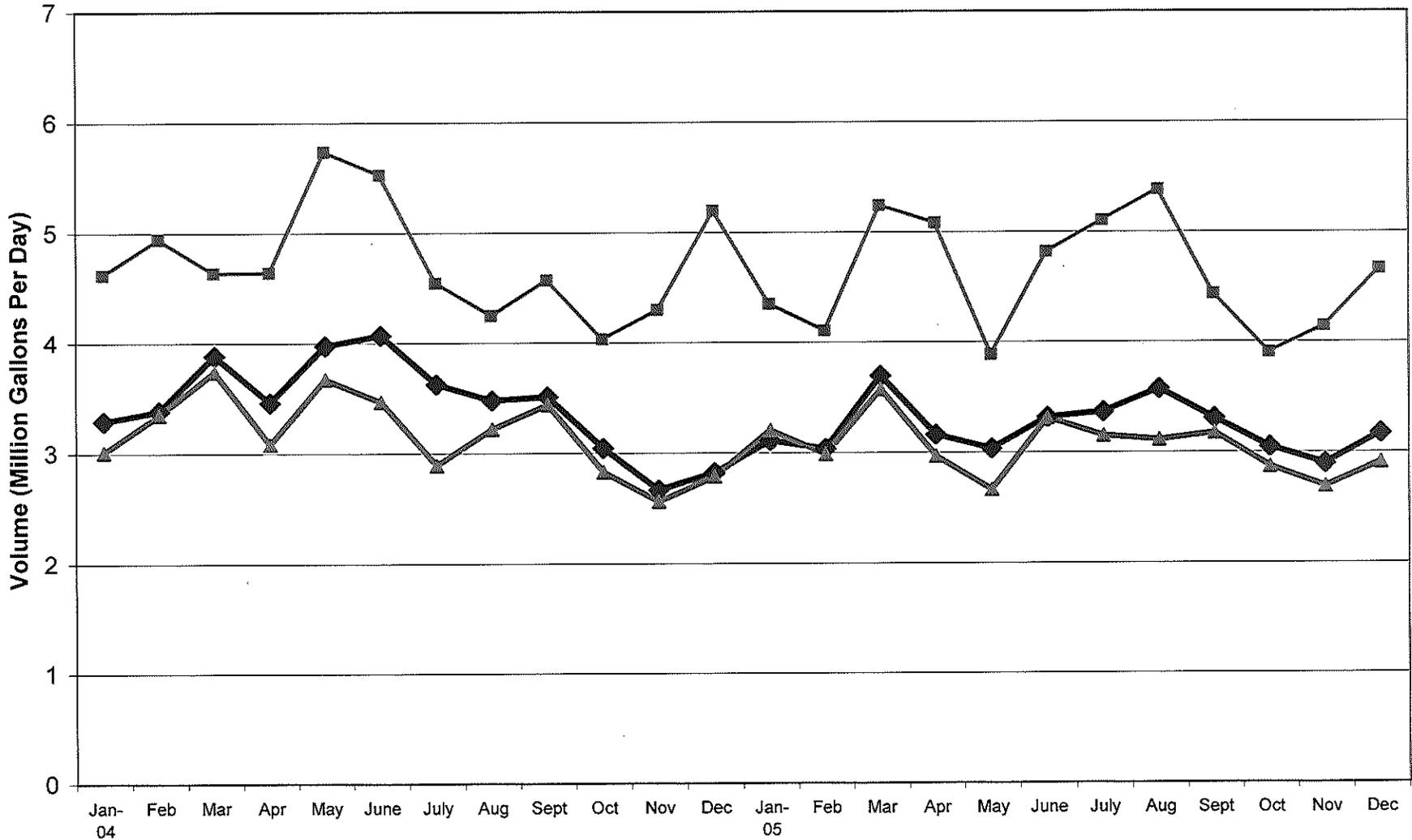
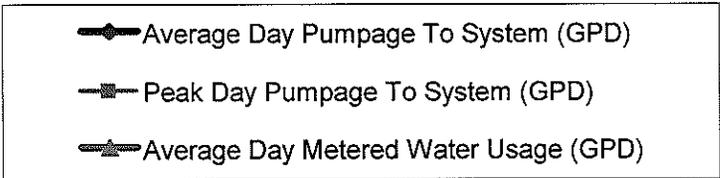


Figure 5B
Water Pumpage and Usage Vs. Peak Day Pumpage
(01/06 thru 12/07)



A comparison of peak day pumpage to average day pumpage yielded ratios as shown below.

<u>Calendar Year</u>	<u>Ratio of Peak Day Pumpage to Avg. Day</u>	<u>Monthly Variation In Peak/Avg. Day Ratio</u>
2003	1.41	1.28 to 1.67
2004	1.42	1.25 to 1.71
2005	1.37	1.20 to 1.64
2006	1.40	1.19 to 1.84
2007	1.42	1.28 to 1.61

An analysis of peak month water pumpage versus average month water pumpage yielded the graph shown in Figure 6.

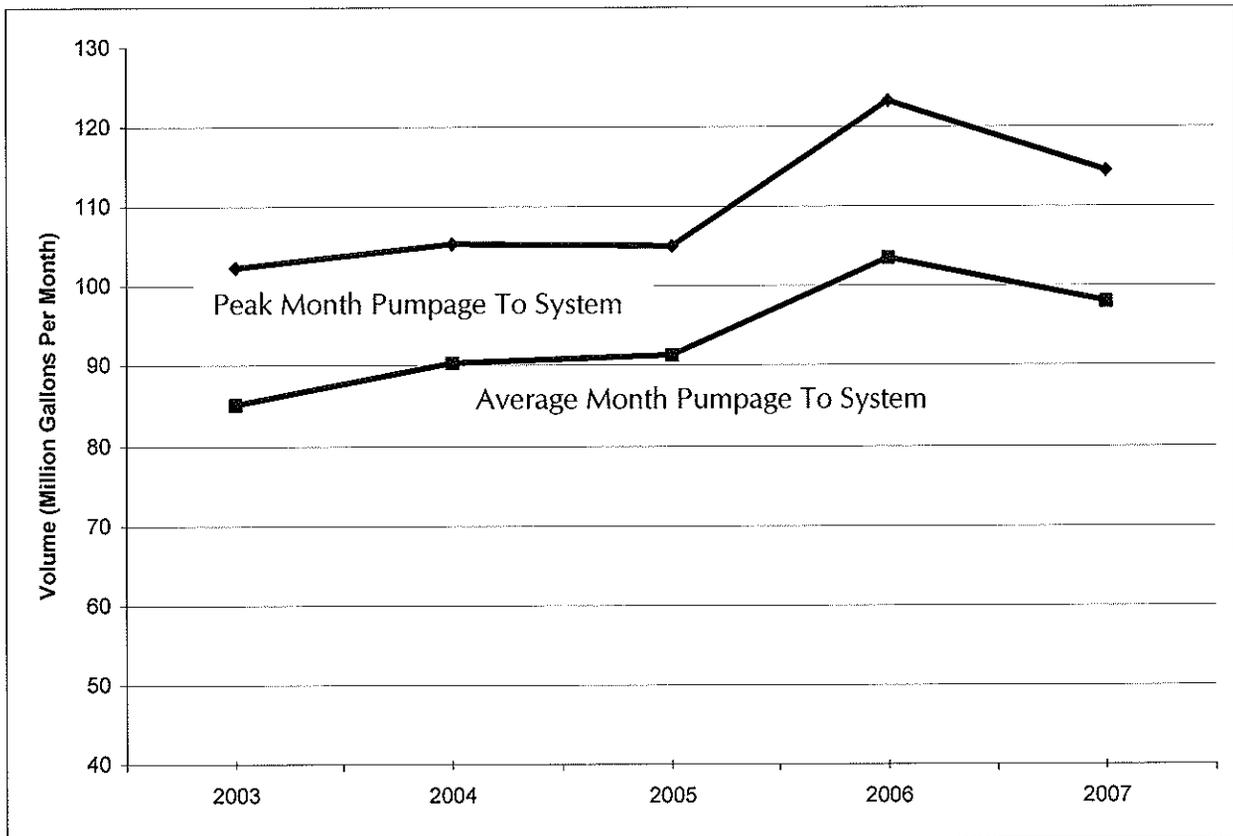


FIGURE 6 – PEAK MONTH VS. AVERAGE MONTH PUMPAGE TO SYSTEM

The data presented previously in this section was analyzed to establish peaking factors for demands that will be placed on Monett's water system in the future. The following peaking factors are anticipated to fairly represent the normal daily and monthly fluctuations in demand that will need to be met.

<u>Daily</u>	<u>Ratio to Average Demand</u>
Weekend Demand	0.70
Average Daily Demand	1.00
Weekday Demand	1.15
Peak Day Demand	1.40
<u>Monthly</u>	
Average Monthly Demand	1.00
Peak Monthly Demand	1.20

B. Residential Demand

The total demand for water by residential users is influenced both by the number of users and the per capita usage.

Monett has seen a steady increase in population over the last fifty years, as shown in Figure 7. From 1940 to 2000, Census Bureau figures show an increase from 4,395 to 7,396 residents in Monett. Current estimates (www.city-data.com) establish a 2006 population of 8,726 in Monett. By utilizing linear regression analysis, Monett's population is projected to be 8,747 by the year 2020 and 9,320 by the year 2030. The correlation coefficient of the analysis is 0.965, which indicates that the population projection fits past trends quite well.

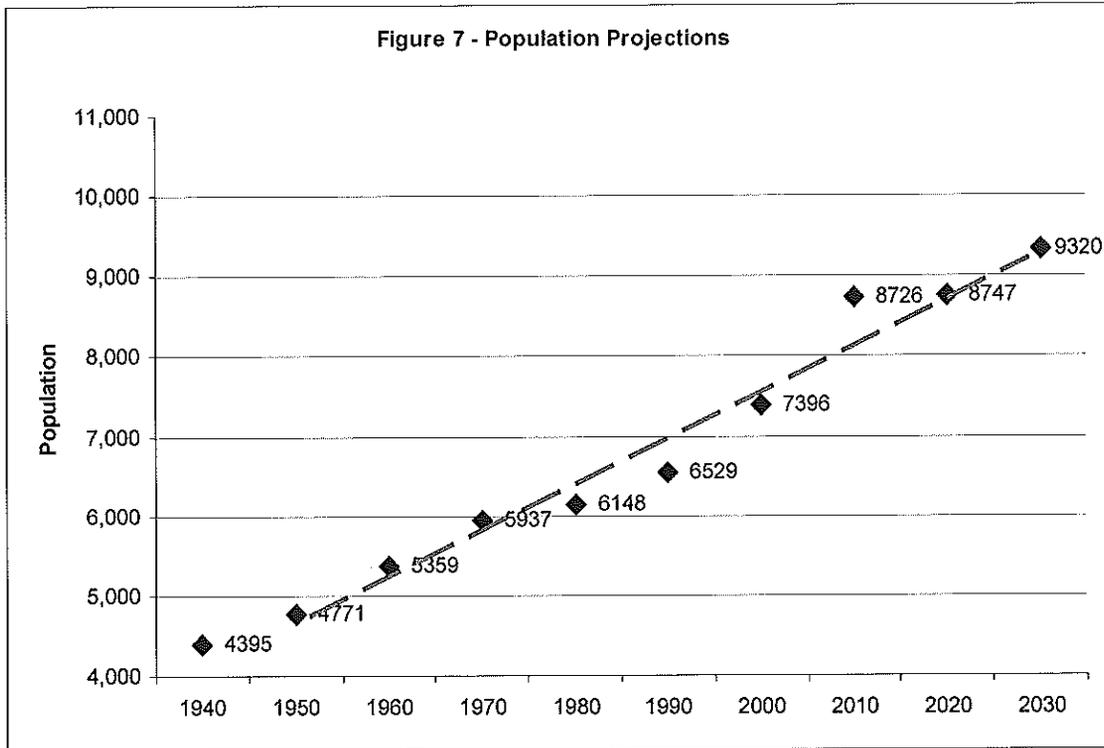


FIGURE 7 – POPULATION PROJECTIONS

For the five-year period from January 2003 through December 2007, per capita water usage in Monett varied from 64.8 to 76.1 gallons per capita per day, as shown in the following tabulation.

<u>Calendar Year</u>	<u>Residential Sales (Gal.)</u>	<u>*Population</u>	<u>Computed per Capita Usage</u>
2003	201,170,000	7966	69.2 gpcd
2004	199,132,000	8156	66.9 gpcd
2005	231,733,000	8346	76.1 gpcd
2006	201,967,000	8536	64.8 gpcd
2007	207,081,000	8726	65.0 gpcd

(*Estimate from interpolation between Year 2000 population of 7966 and estimated Year 2007 population of 8726.)

As a general rule, per capita water consumption tends to increase with time, therefore, it is reasonable to assume that average residential usage will be approximately 80 gallons per capita per day in Monett over the planning period. Based on a typical

demand of 80 gpcd, and utilizing the population projections set forth in Figure 7, the future residential water demands in the City of Monett are estimated as follows:

<u>Year</u>	<u>Projected Average Residential Demand</u>
2007	567,000 GPD
2020	700,000 GPD
2030	746,000 GPD

The City of Monett currently serves a small number of residential users and commercial customers located outside the city limits. The out-of-town users account for less than 4 percent of the residential customers and 2 percent of the commercial accounts.

It is anticipated that the area served by Monett's water system will continue to expand, resulting in additional residential demands beyond those represented by in-town users. At an assumed increase of ten out-of-town residences and one commercial establishment per year to the system, the future water demands resulting from an increased service area would be as follows:

<u>Year</u>	<u>Projected Demand From Increased Service Area</u>
2007	0
2020	29,000 PGD
2030	51,000 GPD

C. Commercial Demand

Commercial water demand tends to parallel residential growth. For the five-year period from 2003 through 2007, commercial water sales have varied as follows:

<u>Calendar Year</u>	<u>Sales (Gal.)</u>
2003	97,364,000
2004	91,013,000
2005	98,855,000
2006	80,913,000
2007	91,682,000

In order to project growth in commercial water use, it will be assumed that commercial growth and associated water demand will parallel increases in residential water demand. Residential water demand was previously projected to increase 23.5% by the year 2020 and 31.6% by the year 2030. Similar increases in commercial demands equate to the following estimates for commercial water usage:

<u>Year</u>	<u>Projected Average Commercial Demand</u>
2007	252,000 GPD
2020	311,000 GPD
2030	332,000 GPD

D. Industrial Demand

Industrial water usage is dictated by the nature of the industries being served. Several of Monett's existing industries, such as Tyson's, Dairy Farmers of America, Schreiber, IDF, and EFCO, are "wet" industries whose business requires large amounts of water. Several other industries, while employing a large number of people, do not require significant volumes of water.

It is difficult to estimate future trends in industrial water usage. Existing industries may decide to alter operations in a manner that requires either more or less water. An inspection of past industrial water sales data, shown previously in Figures 4A and 4B bears out the variability of industrial water demands. From 2004 through 2007, industrial water usage fluctuated greatly. Overall, industrial usage in 2007 was 12.6% greater than in 2004.

So long as demands can be adequately met by the City, new "wet" industries may move to town. Limitations in wastewater treatment capabilities may indirectly place limits on the City's ability to adequately serve future wet industries. It is prudent, however, to plan for a reasonable level of industrial growth when looking at future water needs.

For planning purposes, it is recommended that an increase in industrial water demand of 1.5% per year be assumed. The following tabulation reflects future industrial water demands under the assumed conditions.

<u>Year</u>	<u>Projected Average Industrial Demand</u>
2007	1,888,000 GPD
2020	2,291,000 GPD
2030	2,659,000 GPD

E. Municipal Demand

The City of Monett uses water that is accounted for separate from residential, commercial, or industrial customers. Water is used to fill the municipal swimming pool, provide service to municipal buildings, and the like. The following summary reflects that amount of water that has been used by the City in its operations over the last five years.

<u>Year</u>	<u>Municipal Usage (Gal.)</u>
2003	5,452,000
2004	7,944,000
2005	6,459,000
2006	5,357,000
2007	5,744,000

Water usage by the City fluctuates from year to year, but remains a small portion of the total system demand. It is felt that typical use by the City will result in a moderate increase over time, with municipal water demands projected as follows:

<u>Year</u>	<u>Projected Average Municipal Demand</u>
2007	16,000 GPD
2020	20,000 GPD
2030	23,000 GPD

F. Irrigation Demand

Water used for irrigation is metered separately. The following summary reflects the amount of water sold for irrigation over the last three years.

<u>Year</u>	<u>Irrigation Usage (Gal.)</u>
2005	16,892,000
2006	18,947,000
2007	16,214,000

Use of potable water for irrigation is not encouraged in Monett due to the limitations in the availability of groundwater. As the cost of water continues to rise, it is likely that only a limited increase in irrigation demand will be seen. Future irrigation demands are projected as follows:

<u>Year</u>	<u>Projected Average Irrigation Demand</u>
2007	50,000 GPD
2020	55,000 GPD
2030	60,000 GPD

G. Unbilled Demand

The City of Monett utilizes a portion of the water that is pumped from the wells to flush waterlines and wells, fight fires, and the like. These known losses can vary significantly, and are influenced greatly by the periodic wasting of turbid waters from Wells No. 9 and 12. Over the last five years the known losses have varied from 16,892,000 gallons in 2005 to 139,985,000 gallons in 2006.

It is felt that the periodic wasting of turbid waters from Wells No. 9 and 12 cannot be tolerated as a part of the long-range solution to Monett's water needs. The ability of the City to meet system demands is compromised whenever Wells No. 9 or 12 are taken off-line to allow the well to clear up. For this reason it is appropriate to plan for the future treatment of water from these two wells, thereby insuring that this capacity is actually available when needed. Assuming that currently wasted turbid water is treated and used in the future, it is appropriate to reflect only the other unbilled water from waterline flushing, firefighting, etc. in the estimate of future unbilled demands. The estimated unbilled water usage is projected as follows:

<u>Year</u>	<u>Projected Average Unbilled Demand</u>
2007	75,000 GPD
2020	100,000 GPD
2030	120,000 GPD

H. Projected Water Demand

The total anticipated average day demand for City of Monett water through the year 2030 is summarized in the following table.

	<u>Total Estimated Average Day Demand</u>		
	<u>Present Demand (GPD)</u>	<u>Yr. 2020 Demand (GPD)</u>	<u>Yr. 2030 Demand (GPD)</u>
Residential	567,000	700,000	746,000
Commercial	252,000	311,000	332,000
Industrial	1,888,000	2,291,000	2,659,000
Municipal	16,000	20,000	23,000
Irrigation	50,000	55,000	60,000
Unbilled	75,000	100,000	120,000
Increased Service Area		<u>29,000</u>	<u>51,000</u>
Total	<u>2,848,000</u>	<u>3,506,000</u>	<u>3,991,000</u>

When evaluating the adequacy of water supply wells, storage tanks, and the distribution system, it is important to look at peak demands rather than average demands. The previous analysis of historical water usage provided peaking factors, which, when applied to the average day figures in the previous tabulation, yield typical weekday, peak daily, and peak monthly demands that would be expected in the future. These estimates are provided in the following tabulation.

	<u>Total Estimated Average Day Demand</u>		
	<u>Present</u>	<u>Yr. 2020</u>	<u>Yr. 2030</u>
Average Day	2,848,000	3,506,000	3,991,000
Weekday	3,275,000	4,032,000	4,590,000
Peak Day	3,987,000	4,908,000	5,587,000
Peak Month	3,418,000	4,207,000	4,789,000

The previously listed average day demands are based on metered usage, and do not include water lost from the system due to waterline leaks, etc.