

PH. 3. 2008 3-2881 CITY OF KEARNEY NO. 433 P. 2/16

# Executive Summary (FINAL DRAFT)

RECEIVED

MAY 05 2008

DEPARTMENT OF  
NATURAL RESOURCES

This Executive Summary provides an overall summary of the Water Supply System Facility Plan Project. Further detail is presented in the attached Technical Memoranda (TMs). This Summary is organized into the following headings:

- Demand Projections
- Killgore Island Wellfield Modeling
- Water Supply Source Quality
- Identification of Treatment Technologies
- Alternative Wellfield Evaluation
- Management Alternatives
- Distribution System Modeling
- Implementation Plan

The primary purpose of the Facility Plan Project was to determine water supply sources and infrastructure (facilities and equipment) needed to provide a reliable water supply for the City of Kearney through the Year 2015. In addition, consideration has been given to water supply sources beyond 2015.

## Demand Projections

In order to determine needed water sources and infrastructure it was first necessary to estimate future water demands. This work is summarized in the attached TM entitled "Water Demand Projections." Two future demand scenarios were developed; a "high-growth" scenario and a "low-growth" scenario. The high-growth scenario was used to develop and evaluate water supply and management alternatives.

A 2015 population of 37,100 was used, in accordance with projections made by the Kearney Chamber of Commerce. This future population assumes approximately a 1.6-percent annual growth rate. For the purposes of this study, no future service to additional systems outside of the City limits was assumed.

Both peak-day and average future demands were estimated. Peak-day demands are used to size water delivery and treatment systems, and average demands are used to estimate annual energy costs. It was assumed throughout the study that the difference between peak hour and peak day demands will be met through storage within the City.

Historic demands from 1988 through 1994 were used to develop the demand projections. This period of time is believed to be adequately conservative, based upon the fact that 1988 was one of the driest on record, as indicated by the low flows in the Platte River, which are

08VEXECSUM0

ADDITIONAL INFO. FILED	(email) MAY 05 2008
---------------------------	------------------------

app/62

discussed later. To compensate for changing population during this period, demands were considered in terms of gallons per capita per day (gpcd).

The highest peak-day demand during this period of 804 gpcd occurred during June, 1988, and the next highest of 709 gpcd occurred during July 1991. These correspond to actual peak-day demands of 19.1 and 17.6 mgd, respectively. The average annual usage during this 7-year period was 235 gpcd, with a yearly range of 170 to 277 gpcd.

Based on records from 1991 through 1993, industries used between 2.7 and 3.7 percent of the average daily water usage, with an overall average demand of 0.164 mgd. Between 80 and 86 percent of the average annual industrial water usage can be attributed to a single industry, Eaton Corporation.

Future demands under the two growth scenarios are listed below:

- Low-growth: 9.3 mgd average, 26 mgd peak day, 0.26 mgd average for industry.
- High-growth: 10.5 mgd average, 30 mgd peak day, 0.52 mgd average for industry.

By comparison, the current pumping capacity of Killgore Island is 21.3 mgd, based upon actual pumping data for the individual wells. Five of the 1983 wells have historically produced 1,500 gpm each, one of the 1983 wells has produced 1,300 gpm, and the six 1992 wells have produced 1,000 gpm each.

The low-growth demands listed above are based upon the following assumptions:

- 2015 population of 37,100
- Average annual water usage of 250 gpcd
- Peak day water usage of 700 gpcd
- Industrial water usage growth of 1.6 percent per year (same as population)
- Industrial peak day peaking factor, same as residential

The high-growth demands are based upon the following assumptions:

- 2015 population of 37,100
- Average annual water usage of 277 gpcd
- Peak day water usage of 800 gpcd
- Industrial water usage growth of 3.2 percent (double that of population)
- Industrial peaking factor, same as residential

Data from the summer of 1997 suggest that the low-growth scenario may be a closer representation of the future than the high-growth scenario. If this is true, a water system developed for the high-growth scenario would last beyond the Year 2015.

Because the Killgore Island wellfield is recharged by the Platte River, and because flows in the river can be adversely impacted by drought conditions, the duration of peak water demand events is also of critical importance. Duration information was used to interpret the

ADDITIONAL  
INFO. FILED

(email)  
MAY 05 2008

consequences of the Killgore Island Wellfield modeling effort. In order to predict peak demand durations, the following historical periods were examined, encompassing the highest 11 peak-day events during the 1988 - 1994 period:

- Four-month period in 1988
- Four-month period in 1991
- Three-month period in 1990
- Three-month period in 1989

Three-day, 7-day, 14-day, 30-day, and 60-day sustained peaks were calculated in terms of the percentage of the peak-day demand. The most conservative of these percentages are presented in Exhibit 1. For example, if in some future year a peak-day demand of 20 mgd were to occur, it could be expected that the 14-day average demand surrounding this event could be as high as 88 percent of this demand, or 17.6 mgd. This would mean that, on the average, the wellfield would be called upon to supply 17.6 million gallons for each day during that 14-day period.

EXHIBIT 1  
Keamey Water Supply Facility Plan  
Sustained Peak Water Demands

Averaging Period	Percentage of Peak Day
3-day	98
7-day	95
14-day	88
30-day	78
60-day	67

Future peak-day water demands during non-irrigation season were also estimated, based on historic data from December, January and February of 1988 through 1994. The highest peak-day demand of 4.6 mgd occurred during December, 1989. This demand would be expected to grow to peak day demands of 6.6 and 7.5 mgd for the low-growth and high-growth scenarios, respectively.

## Killgore Island Wellfield Modeling

"Sustainable Yields" from the Killgore Island Wellfield under various drought conditions in the Platte River were estimated for the following three wellfield scenarios (the term "Sustainable Yield" is defined later):

- Current situation, with a 21.3-mgd wellfield pumping capacity

ADDITIONAL INFO. FILED	(email) MAY 05 2008
---------------------------	------------------------