WATER USE STUDY
NORTH CENTRAL MISSOURI REGIONAL WATER COMMISSION
SULLIVAN COUNTY, MISSOURI
May 20, 2004

INTRODUCTION

This report was completed at the request of the North Central Missouri Regional Water Commission (the commission). The commission is a newly formed water supply commission that is trying to determine the feasibility of building a water supply source and constructing the facilities necessary to wholesale water to existing pubic systems in north central Missouri. At a meeting with the representatives of the commission, the Natural Resources Conservation Service (NRCS) and the Department of Natural Resources (the department), commission members requested that department staff evaluate the proposed water uses in commission area. The following is a summary of that evaluation prepared by Everett Baker of the Northeastern Regional Office.

DISCUSSION

Lists of potential water users were presented in the 2003 Water System Feasibility Study for the Commission done by Burns & McDonnell consulting engineers of Kansas City, Missouri. The department was informed that the lists include any public water system that showed an interest in supporting the new commission. The Burns and McDonnell Feasibility Study lists were used as the basis for this report.

To develop the "Potential Commission Customers" list a time period of twenty years was used and systems were evaluated on the likelihood that they will need to purchase water or to make major source or treatment improvements in the next twenty years. Since the water supply project is based on a longer projection, using a 20-year timeframe may result in conservative estimates of the water needs of the area From the lists in the feasibility study, a list of potential customers was developed, based on known information about the systems. Thirty-four systems have the potential or desire to purchase all or part of their water from the Commission. A table of "Potential Commission Customers" is attached.

Many public water systems and communities in north central Missouri support the commission because they know that an adequate water supply is essential for the economic well being of the area. However, that does not mean that all of these systems are interested in purchasing water from the commission. For example, Chillicothe is supportive of the commission but is unlikely to purchase water from the commission. Chillicothe is around fifty miles from the proposed commission treatment plant and has a 4.5 mgd groundwater treatment plant with an adequate source of water. It has enough water users within the city to adequately support the water system and its water system has a relatively low debt burden. Thus, Chillicothe has no reason to purchase water from the commission.

Therefore, for the purposes of this study, the lists of systems in the Feasibility Study was revised to create a list of systems that are, in the department's opinion, truly potential customers of the

Commission. Some of these customers would likely buy water as soon as it became available while others would link to the system at a later date.

Once a list of potential customers was developed an estimation of their water needs was done. Using data collected during sanitary surveys and other department inspections of the systems, information was compiled on the number of active water services and population and daily average and maximum daily water usage for each system.

The information presented on the potential customers is the most current actual status of these systems and does not project future growth. A column showing sales to other systems (secondary sales) is provided because usage by secondary customers was subtracted from the primary customer usage. This was necessary to prevent water use by systems that presently purchase water from being entered twice in the calculations. First, as usage by the wholesaler and then as usage by the individual systems. Thus, the average daily usage figures are actual usage by only the system listed and not its wholesale customers. In addition, it allows each separate system to be evaluated individually regardless of whether they purchase water or have their own source. The data shows that currently the average daily water usage of all of the systems is 6,715,102 gallons and the maximum daily usage is 9,900,145 gallons. What is clear is the potential water needs exceed the capacity of present sources and show the need for an adequate water source for north central Missouri.

Once information on the potential commission customers was presented to representatives of the commission, a request was made to look at systems that may become immediate customers of the commission. This was requested to help the commission look at how to meet immediate needs and to estimate potential income. The list of thirty-four potential customers was reduced to a list of sixteen immediate probable customers. By immediate it is meant that they may become customers of the commission within five to ten years after commission water is available. A table of "Immediate Probable Commission Customers" is attached.

Justification for including each system on the Immediate Probable Commission Customers list and estimates of water use are as follows. To predict future use, the past water use of each system was evaluated under the concept that past growth trends can be projected into the future. Although, the lake is designed to serve until the year 2060, the projections of future growth in this report are limited to 20 years. The department did not feel that it had enough information to project growth beyond 20 years. The predictions of future water use are presented in the attached table "Projected Growth in Water Usage in 20 years."

Except for Milan, the information presented in the table of Immediate Probable Commission Customers is the most current actual status of these systems and does not project future growth. Future growth is presented in the Projected Water Usage table. Because the city of Milan has been under either voluntary or mandatory water conservation for several years, the most recent water use information does not reflect normal water use. Using historical information, an estimate was made of normal usage at Milan. However, the closing of a major water customer, ConAgra, complicates the estimate. The former ConAgra plant has been taken over by Premiere Foods but historical water use by ConAgra may or may not be repeated by Premiere Foods. Since Premiere Foods has just started operation it is difficult to predict what their water use will

be. The water use estimate for Milan includes the current usage by Premiere Foods and an estimate of normal usage by the city without ConAgra. This again may be a conservative estimate of likely future use.

Browning purchases water from Sullivan PWSD #1 and likely will be a client of the commission when a source is built. Water use in Browning has remained stable over the past eight years at a little over 21,000 gpd. Water use can be expected to remain stable in the future.

Humphreys purchases water from Sullivan PWSD #1 and likely will be a client of the commission when a source is built. Water use in Humphreys has increased from 7,000 gpd in 1990 to 8,000 gpd in 2000, which corresponds to roughly a 1.4 % rate of growth. The number of active services has increased over the same period and verifies that the increased usage is due to growth. At a rate of growth of 1.4 % water demands in Humphreys will be 10,560 gpd in 20 years.

Green Castle purchases water from Green City and will be a customer of the commission when Green City connects to Sullivan PWSD #1 in the near future. Over the past ten years water use had declined in Green Castle, although the population has been stable. The decline in water use can be attributed to leaks in the old, glue joint, plastic mains in the system. The worst of these mains have been replaced, which has reduced water use. Therefore, water use in Green Castle is expected to remain stable at 19,000 gpd to 20,000 gpd over the next twenty years.

Green City presently has its own treatment plant but is in the process of constructing a water main and pumping station to purchase water from Sullivan PWSD #1. Over the past ten years water use has declined from a high of 127,000 gpd to 72,446 gpd. The decline in water use is partly due to population decline but is mainly caused by reducing excessive water loss. In the past ten years, most of the water mains in the town have been replaced, which should correct the excessive water loss. Subsequently, water use can be expected to remain the same or to increase slightly over the next 20 years.

Milan presently is the main supplier of water to Sullivan County but will be a prime member of the Commission when a source is built. Predicting water use in Milan is complicated because of the effect of a major water user, ConAgra. Over the years water use in Milan has varied widely depending on the type and level of production at ConAgra. Moreover, Premium Standard Farms has caused growth throughout several counties and it has caused some growth in Milan. A conservative estimate of the rate increase of water use in Milan is 1.5 %. At a rate of growth of 1.5 % water use by the people of Milan will be 492,950 gpd in 20 years.

Newtown purchases water from Sullivan PWSD #1 and likely will be a client of the commission when a source is built. Water use in Newtown has increased from 16,000 gpd to 18,311 gpd over the past ten years, which is a growth rate of roughly 1.3 %. At a rate of growth of 1.3 % water demands in Newtown will be 23,708 gpd in 20 years.

The Premium Standard Farms processing plant at Milan presently uses raw water from Elmwood Lake and treats its own water and is expected to continue doing this in the future. However, the plant has wanted to add a second shift for some years but has been restricted by lack of water.

Because Elmwood Lake has limited capacity, Premium Standard Farms must supplement the lake with water from another source. Premium Standard Farms officials have approached the commission to purchase raw water from the new lake. The additional shift could require 500,000 gpd to 750,000 gpd. In addition, the increase in the work force will increase water demands mainly in Sullivan PWSD #1 and some of the small communities that it serves.

Sullivan PWSD #1 currently purchases water from Milan, Green City and Trenton but will be a prime member of the commission when a source is built. Water use in the district has grown steadily over the years. A major cause of increased water use has been expansions of the district to serve additional users. However, Premium Standard Farms has caused more growth in Sullivan PWSD #1 than in Milan. Because land for new housing is limited in Milan, most new home building to serve people working for Premium Standard Farms has occurred in the county along Sullivan PWSD #1 mains. In addition, more rental housing is available in the district than in Milan. Excluding expansions water use, growth in the district has been roughly 3.9 %. The expansion of Premium Standard Farms and increased hiring by Premiere Foods is expected to continue this growth rate. At a rate of growth of 3.9 %, water use by Sullivan PWSD #1 will be 709,290 gpd in twenty years.

Linn CPWSD #1 has a water treatment plant and produces all of its water. However, the district is having difficulty obtaining wells that will maintain their yields and is trying to drill a fifth well at this time. In spite of extensive test drilling, a better well field has not been discovered. Thus, it is probable that the district will face the need for an additional source in the near future. The district board has attempted to purchase water from Brookfield in the past and some board members are interested in purchasing water from Sullivan PWSD #1 now. Water use in the district has increased from 68,000 gpd to 91,000 gpd in the past ten years, which is a growth rate of roughly 3.0 %. At a rate of growth of 3.0 % water use by Linn CPWSD #1 will be 164,000 gpd in twenty years.

Bucklin has a surface water treatment plant that produces the water for the city and sells water to Chariton – Linn PWSD #3. The capacity of the lake that serves Bucklin is inadequate because of severe silting and increased water demands. The lake must be supplemented with routine pumping from Mussel Fork Creek. In addition, without the water sales to Chariton – Linn PWSD #3 the city would be unable to financially support the treatment plant and source. Even with the sales to Chariton – Linn PWSD #3, the city will not be able to sustain the plant and lake as they age. Moreover, it is possible that Bucklin could purchase water from the commission cheaper than it now costs them to produce the water. Not counting sales to Chariton – Linn PWSD #3 water use in Bucklin has declined over the past ten years. Whether it will continue to decline or whether it will stabilize is difficult to tell. For the purposes of this report, water use at Bucklin is expected to remain stable at 27,000 gpd.

Laclede presently purchases all of it water from Brookfield. However, in the past, they have approached Linn CPWSD #1 to purchase water from the district and the council is interested in the commission concept. They did not purchased water from Linn CPWSD #1 because the district was unable to serve them. Current water use is 36,986 gpd with little difference between maximum usage and average usage. Water use and the number of active services in Laclede has increased steadily over the past ten years with the growth rate of water use at 2 % and the growth

in meters at 6 %. Because of reductions in water loss in the system, water use has not grown at the same rate as the growth in meters. Using a growth rate of 2 % water use in Laclede will be 54,960 gpd in twenty years. Because reductions in water loss will reach a limit, this may be a conservative estimate.

Chariton-Linn PWSD #3 presently purchases all of its water from three sources: Brookfield, Bucklin and Marceline. All three systems are limited as to the amount of water that they can sell because of their sources. Brookfield must pump frequently from Yellow Creek to supplement its lake and has been unable to maintain lake water levels this past year. Bucklin officials have already expressed an interest in purchasing water from the commission, which will eliminate them as a source. Thus, it is logical that Chariton-Linn PWSD #3 will purchase at least part of its water from the commission when it is available. Water use in Chariton-Linn PWSD #3 has grown rapidly and has more than doubled over the past ten years. This has been caused by district expansions in the early 1990s. However, in the past five years the rate of growth has slowed to around 1.2 % per year. Currently, water use in Chariton-Linn PWSD #3 is 307,665 gpd so at a growth rate of 1.2 % future water use will be 390,000 gpd.

Mercer PWSD #1 presently purchases all of its water from two sources: Princeton, Missouri and Rathbun Regional Water Association in Iowa. The district has been growing steadily at a rate of 2 % per year and is seeking more water. Because of source issues the city of Princeton is unable to supply more water to the district and may be interested in purchasing water from the commission in the future. In addition, Rathbun Regional Water Association has refused to increase the contract amount of water that it will sell to the district. Rathbun Regional Water Association is limited on the amount of water it can get from Rathbun Lake and in its ability to deliver water to the Mercer County area. Mercer PWSD #1 officials have contacted both Sullivan PWSD #1 and Putnam PWSD #1 to purchase water. Once commission water becomes available, Mercer PWSD #1 would be a probable customer. Presently the district is using an average of 214,063 gpd and in twenty years at a 2 % growth rate it will be using 318,000 gpd.

Adair PWSD #1 presently purchases all of its water from the city of Kirksville. Reportedly, Kirksville had a capacity study done of its water source and has notified officials of Adair PWSD #1 that if a water using manufacturer moves into Kirksville the district will be expected to get water somewhere else. In addition, some areas of Adair PWSD #1 could be served more easily from Sullivan County than from Kirksville. Thus, it is reasonable to believe that Adair PWSD #1 will purchase water from the commission when it is available. Water use in Adair PWSD #1 has been growing at a rate that exceeds previous predictions. Part of the growth has been because of additional customers but part has been because of increased use per customer. The higher use per customer is caused by the change in the type of customer from farm operations to residential acreages. Presently, the district is using 508,000 gpd with water use growing at the rate of 4.2 % per year. In twenty years at a 4.2 % growth rate it will be using 1,394,120 gpd.

Novinger currently purchases all of its water from Adair PDWP #1 and is located on the west side of the district. If Adair PDWP #1 purchases water from the commission, Novinger will be included. Water use has declined in Novinger over the past ten years but seems to have stabilized at roughly 30,000 gpd in the last five years. Moreover, the number of active water

services seems to have stabilized as well. For the purposes of this report, water use at Novinger is expected to remain stable at 30,000 gpd.

LaPlata currently has its own water supply lake and treatment plant but it will close the plant and purchase water from Adair PDWP #1 as soon as the district can provide water service. LaPlata is in an area that could be served by commission water if Adair PDWP #1 purchases water from the commission. A review of the past ten years shows that water production in LaPlata has generally declined. However, the plant master meter was inaccurate and reported higher than actual plant production and the system operators have taken other actions to reduce water loss. Thus, it is difficult to determine whether reduced production is reflecting a true decline in water use. For the purposes of this report, water use at LaPlata is expected to remain stable at 112,000 gpd.

CONCLUSION

For drinking water purposes, the sustained yield of the 1600-acre water supply lake is estimated to meet a 5,750,000 gallon per day. As presently proposed, the lake capacity is not adequate to meet the current water needs of the Green Hills Region described in the Water System Feasibility Study. Moreover, the lake capacity is not adequate to meet the current water needs of the revised list of thirty-four potential customers developed in this report. Consequently, either the capacity of the source must be increased or the number of potential customers reduced. Only the commission can decide this issue. Clearly, the potential water needs show the need for and adequate water source for north central Missouri and show that the needs exceed the capacity of the source currently proposed.

While raising the height of the dam provides some additional storage, the limiting factor in the reliable yield of the reservoir is the size and precipitation of the upstream basin. The commission needs to consider the added cost of the additional supply that would be made available by raising the height of the dam. The higher dam would also produce a greater fluctuation in lake levels. This would likely add to water processing costs as well.

A list of sixteen immediate probable customers was developed to allow the commission to look at how to meet immediate needs and to estimate short term potential income. The current, daily, average, water usage by these systems is 3,054,645 gallons with a maximum daily usage of 3,948,121 gallons. The predicted daily, average, water usage by these systems is 4,340,034 gallons with a maximum daily usage of 4,471,378 gallons. Because the commission proposes to use the existing Milan water treatment plant to serve the commission members, the capacity of this plant must be considered. The plant has a capacity of 2,000 gpm, which will serve a maximum peak day of 2,880,000 gallons and an average daily production of 2,000,000 gallons. Thus, the plant does not have the capacity to serve the current daily water needs of these systems and must be expanded in the next five to ten years. Expansion of the plant is a major expense that must be considered by the commission.

The growth projections in this report cover a 20-year period even though the lake is designed to serve for 60 years. The growth projections indicate that average water usage will increase by roughly 1,285,000 gpd in the next twenty years. Accordingly, if growth continues as projected,

the daily average water usage will be at the capacity of the proposed lake in roughly 42 years of serving just the sixteen immediate probable customers. This is roughly twenty years earlier than the 2060 design life of the lake. Should some of the other potential users connect to the system, the design capacity of the source will be reached sooner.

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