

# GROUND WATER SYSTEM EVALUATION<sub>5</sub>

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## ALBANY

The city of Albany is served by 6 shallow walled wells. The wells are low to moderate producers. One of the existing 6 wells has an elevated level of ammonia. This is indicative of potential pollution, but to date there has not been any significant increase in the level of nitrates. The water has some iron and is hard. The wells also serve Gentry County PWSD #1 and the city of New Hampton. Location of new wells has been somewhat difficult. The wells require routine costly acidification in order to maintain production capacity. Long term, the city should be looking to either making major additions to the treatment system or purchasing at least supplemental treated water from another source.

The facility has a current source capacity of 860,000 gallons per day a treatment capacity of 1,000,000 gallons per day, an average use of 430,000 gallons per day, and a maximum day use of 608,000 gallons.

If the type of wells utilized is pumped daily at rated capacity their life expectancy may be reduced, so optimum capacity should not be taken at more than seventy five percent of rated capacity. The source availability would not be adequate for the system to become any greater participant in supplying water to others.

## BARNARD

The city of Barnard is served by 2 shallow gravel walled wells. The wells are low producers. The water treatment plant was expanded and part of it was updated several years ago. The treatment plant does not meet present design standards. Locating new wells of adequate capacity in the area would be difficult if not impossible. The city needs to consider the purchase of treated water from another source such as Nodaway County PWSD #1.

The facility has a current source capacity of 72,000 gallons per day a treatment capacity of 50,000 gallons per day, an average use of 22,000 gallons per day, and a maximum day use of 29,000 gallons.

If the types of wells utilized are pumped daily at rated capacity their life expectancy may be reduced, so optimum capacity should not be taken at more than seventy five percent of rated capacity.

The life expectancy of the treatment facility is not adequate to consider becoming source for any additional consumers. The source is not adequate to support the city becoming a regional supplier of water.

## **BOLCKOW**

The city is served by 4 shallow gravel walled wells, all of which are low producers. The city has had to abandon two wells that no longer produced water. The raw water is high in iron and manganese, and relatively hard. They are located in an area that has flooded in the past, but should now be above flood level. The wells require costly routine acidification to maintain production. They serve the city of Bolckow and Andrew County PWS #4. They may also start serving the city of Rosendale. The system has a maximum design capacity of 144,000 gallons per day.

The facility has a current source capacity of 179,000 gallons per day a treatment capacity of 144,000 gallons per day, an average use of 50,000 gallons per day, and a maximum day use of 84,000 gallons.

If the types of source wells utilized are pumped daily at rated capacity their life expectancy may be reduced, so optimum capacity should not be taken at more than seventy five percent of rated capacity. The capacity of wells in this formation has shown signs of this happening.

The source is not adequate for the city to expand their role as a regional supplier of water.

## **BRAYMER**

The city of Braymer is served by 4 shallow gravel walled wells. They are of the gravel walled type and are located within a flood plain, but are protected. Production of the wells is low to moderate. Water from the wells is high in iron and manganese and is hard. Two of the wells are located about 3 miles from the water treatment plant. Locating new wells is somewhat difficult. The wells require costly routine acidification to maintain production capacity.

The facility has a current source capacity of 115,000 gallons per day a treatment capacity of 201,600 gallons per day, an average use of 80,000 gallons per day, and a maximum day use of 146,000 gallons.

If the type of wells utilized are pumped daily at rated capacity their life expectancy may be reduced, so optimum capacity should not be taken at more than seventy five percent of rated capacity.

The water treatment plant is in need of replacement. The source is not adequate for the city to become a regional supplier of water

## BURLINGTON JUNCTION

The city of Burlington Junction is served by 3 shallow gravel walled wells. The wells are low producers. One well located in the water treatment plant is not properly sealed and therefore susceptible to contamination. Only one of the wells is adequate to produce the amount of water necessary to serve the city. The water treatment plant is old and does not meet design standards. The city needs to be considering obtaining treated water from some other source such as Nodaway County PWSD #1. The source is not adequate to support the city becoming a regional supplier of water.

The facility has a current source capacity of 130,000 gallons per day a treatment capacity of 130,000 gallons per day, an average use of 45,000 gallons per day, and a maximum day use of 80,000 gallons.

If the type of wells utilized are pumped daily at rated capacity their life expectancy may be reduced, so optimum capacity should not be taken at more than seventy five percent of rated capacity.

The water treatment plant is in need of replacement; parts of it are 75 years old. The system is not adequate for the city to become a regional supplier of water

## CALDWELL COUNTY PWSD #1

The water district is served by two shallow gravel walled wells. The wells are low producers. The water is high in iron and manganese. The wells are located in a flood plain, but protected. The wells require costly routine acidification to maintain capacity. Location of additional wells might be difficult and costly.

The facility has a current source capacity of 68,800 gallons per day a treatment capacity of 68,000 gallons per day, an average use of 30,000 gallons per day, and a maximum day use of 40,000 gallons.

If the type of wells utilized are pumped daily at rated capacity their life expectancy may be reduced, so optimum capacity should not be taken at more than seventy five percent of rated capacity.

The wells and water treatment plant are 38 years old, and in need of replacement. The source and treatment facility is not adequate for the water district to become a regional supplier of water.

## CLEARMONT

The city of Clearmont is served by 2 shallow gravel walled wells. The wells are low producers. There has been some problem with the water being contaminated with MTBE a contaminant found in gasoline. The levels have dropped, leading MDNR staff to believe that the plume of contamination has passed through the area of the wells and their withdrawal area. The city needs to be considering and planning for obtaining water from another source. The city has had problems in providing adequate operational staff for the water system.

The facility has a current source capacity of 43,200 gallons per day a treatment capacity of 50,000 gallons per day, an average use of 17,000 gallons per day, and a maximum day use of 30,000 gallons.

If the type of wells utilized are pumped daily at rated capacity their life expectancy may be reduced, so optimum capacity should not be taken at more than seventy five percent of rated capacity.

The water treatment plant is 42 years old and in need of replacement, and the two wells being used are 21 and 30 years old. The source and treatment facilities are not adequate for the city to become a regional supplier of water.

## CONCEPTION JUNCTION

The city of Conception Junction is served by 3 shallow gravel walled wells. The wells are low producers and the water is high in iron and manganese. The wells require costly routine acidification to maintain production capacity. The water treatment plant is in extremely poor physical condition and has needed to be replaced for years. The city needs to be planning for obtaining treated water from another source. Water is available from Nodaway County PWSD #1 with a minimum of piping. The source is not adequate to support the city becoming a regional supplier of water.

The facility has a current source capacity of 108,000 gallons per day a treatment capacity of 50,400 gallons per day, an average use of 15,000 gallons per day, and a maximum day use of 31,000 gallons.

If the type of wells utilized are pumped daily at rated capacity their life expectancy may be reduced, so optimum capacity should not be taken at more than seventy five percent of rated capacity.

The wells and water treatment plant are old, and are in need of replacement The source and treatment facility are not adequate for the city to become a regional supplier of water.

## CRAIG

The city of Craig is served by 2 shallow gravel walled wells located in the fringe of the Missouri River Alluvium and are moderate producers. The wells provide for the city, the Village of Big Lake, Big Lake State Part, a gasohol plant, and part of Holt County PWSD #1. The water is hard and high in iron. One of the wells was unused for a number of years because of high levels of chlorides as a result of improper storage of salt for the old zeolite softening process. Levels of chloride are now within limits. The water treatment system is of insufficient capacity to provide for current demand. The city needs to drill additional wells, and build a new larger capacity lime softening treatment plant or purchase treated water from another source.

The facility has a current source capacity of 340,000 gallons per day a treatment capacity of 200,000 gallons per day, an average use of 74,000 gallons per day, and a maximum day use of 190,000 gallons.

If the type of wells utilized are pumped daily at rated capacity their life expectancy may be reduced, so optimum capacity should not be taken at more than seventy five percent of rated capacity.

The wells and water treatment plant are old, and have been expanded at least once, and are in need of replacement. The source and treatment facilities are not adequate for the city to expand its role as a regional supplier of water.

## FAIRFAX

The city of Fairfax is served by 2 shallow gravel walled wells, all of which are low producers. The city has had to abandon at least 3 wells that no longer produced water. The raw water is high in iron and manganese and is hard. One of the wells is located in a flood plain, but is protected to above flood level. They serve only the city of Fairfax. Locating new wells near the city has not been easy. The wells require costly routine acidification to maintain production capacity.

The facility has a current source capacity of 201,000 gallons per day a treatment capacity of 288,000 gallons per day, an average use of 93,000 gallons per day, and a maximum day use of 169,000 gallons.

If the type of wells utilized are pumped daily at rated capacity their life expectancy may be reduced, so optimum capacity should not be taken at more than seventy five percent of rated capacity.

The water treatment facility will need major maintenance within the next 10 years. The source is not adequate for the city to become a regional supplier of water.

## FILLMORE

The city of Fillmore is no longer operating its water treatment system. They now purchase water from Andrew County PWSD #3 which they previously served. The water district purchases water from the city of Savannah.

When operating, the city of Fillmore was served by 2 shallow gravel walled wells, both of which are low producers. The city had abandoned 1 well that no longer produced water. The raw water was hard, high in iron and one well was extremely high in manganese. The wells are located in a flood plain, but are protected to above flood level. The wells require costly routine acidification to maintain production capacity.

## GALLATIN

The city is served by 2 shallow gravel walled wells. The wells are drilled into pre glacial stream channels. The wells are moderate producers. The city has a third well that was drilled but never utilized due to low yield. Location of additional wells is difficult and costly, and they need at least one additional well to meet demand with one well out of service. They must occasionally acidify the wells to maintain production capacity. They are producing as much water as the water treatment plant is capable of producing. The maximum use actually exceeds their production capacity by about 38 percent.

The facility has a current source capacity of 806,000 gallons per day a treatment capacity of 400,000 gallons per day, an average use of 377,000 gallons per day, and a maximum day use of 532,000 gallons.

### **Gallatin continued**

If the type of wells utilized are pumped daily at rated capacity their life expectancy may be reduced, so optimum capacity should not be taken at more than seventy five percent of rated capacity.

The water treatment facility needs some major renovations and expansion in order to meet present demands. The source is not adequate for the city to increase its role as a regional supplier of water.

## GRAHAM

The city of Graham is served by 1 shallow gravel walled well. The well has shown some nitrates but has not exceeded half the MCL. The only treatment provided is aeration and disinfection. There are other private wells located in the vicinity of this well that are higher producers but their chemical analysis is unknown. The city should have at least one additional well to insure continued service. The water treatment facilities need to be updated or replaced.

## **Graham continued**

The facility has a current source capacity of 64,000 gallons per day a treatment capacity of 64,000 gallons per day, an average use of 18,000 gallons per day, and a maximum day use of 35,000 gallons.

If the type of wells utilized are pumped daily at rated capacity their life expectancy may be reduced, so optimum capacity should not be taken at more than seventy five percent of rated capacity.

The water treatment facility is quite old and needs to be replaced. The source is not adequate for the city to become a regional supplier of water.

## **HARRISON COUNTY PWSD #2**

The water district is served by five shallow gravel walled wells drilled into a pre-glacial river channel. The wells are moderate producers. The water is low in iron and manganese. The wells are flood protected. The wells require costly routine acidification to maintain capacity. Location of additional wells is difficult and costly.

The facility has a current source capacity of 691,000 gallons per day a treatment capacity of 400,000 gallons per day, an average use of 450,000 gallons per day, and a maximum day use of 615,000 gallons.

If the type of wells utilized are pumped daily at rated capacity their life expectancy may be reduced, so optimum capacity should not be taken at more than seventy five percent of rated capacity.

The water level in the well field has lowered approximately 80 feet in the last ten years and is the departments opinion that additional wells should not be located in the aquifer until it can be determined that the water level will stabilize.

The source and treatment facility is not adequate for the water district to expand their supplying of water to the region.

## **HOPKINS**

The city is served by 6 shallow gravel walled wells and sand points. The wells are low producers. The city has abandoned several sand points due to low production or screen failure. The water is high in iron and manganese. The wells are located in flood plain but protected. The system has very little excess capacity. Location of new wells may be difficult and not very productive. The city needs to be looking at obtaining treated water from another source.

### **Hopkins continued**

The facility has a current source capacity of 173,000 gallons per day a treatment capacity of 144,000 gallons per day, an average use of 41,000 gallons per day, and a maximum day use of 109,000 gallons.

If the type of wells utilized are pumped daily at rated capacity their life expectancy may be reduced, so optimum capacity should not be taken at more than seventy five percent of rated capacity.

The water treatment facility had an aerator, new filtration and high service pumping added several years ago. The source is not adequate for the city to become a regional supplier of water.

## **KINGSTON**

The city of Kingston is served by 3 shallow gravel walled wells. The wells are low producers. The water is high in iron and manganese. The wells are located in a flood plain, but protected. The wells require costly routine acidification to maintain production capacity. Location of additional wells would require moving some distance from the existing ones. The water treatment plant needs replacement. The city has passed bonds to pay for building a new water treatment plant and elevated storage tank. They will also need to construct one new well.

The facility has a current source capacity of 237,000 gallons per day a treatment capacity of 72,000 gallons per day, an average use of 33,000 gallons per day, and a maximum day use of 55,000 gallons.

If the type of wells utilized are pumped daily at rated capacity their life expectancy may be reduced, so optimum capacity should not be taken at more than seventy five percent of rated capacity.

The water treatment facility needs to be replaced, and additional elevated storage is needed to provide required distribution system pressure. The source is not adequate for the city to become a regional supplier of water.

## **MAITLAND**

The city of Maitland is served by 2 shallow gravel walled wells. The wells are low producers and the water is high in nitrates, and the nitrate level has increased since the wells were drilled. The nitrate level is greater than half the Maximum Contaminate Level (MCO) and the city currently must provide quarterly notification to their consumers for the benefit of childbearing customers. The city has abandoned 2 wells due to nitrate levels exceeding the MCL for nitrates. Locating new wells would most likely be difficult

**Maitland continued**

and costly, and might require drilling on the other side of the Nodaway River in order to find adequate water and water that the nitrate level is below the MCL.

The facility has a current source capacity of 200,000 gallons per day a treatment capacity of 100,000 gallons per day, an average use of 25,000 gallons per day, and a maximum day use of 51,000 gallons.

If the type of wells utilized are pumped daily at rated capacity their life expectancy may be reduced, so optimum capacity should not be taken at more than seventy five percent of rated capacity.

With the problem of nitrates and limited raw water source, the source is not adequate for the city to become a regional supplier of water.

**MO AM (Missouri American, located at St. Joseph)**

MO AM is served by 9 gravel walled wells, and one collector well. The wells are located in the Missouri River alluvium and are high producers. The water is high in iron, and is relatively hard.

The facility has a current source capacity of 44,800,000 gallons per day a treatment capacity of 30,000,000 gallons per day, an average use of 15,000,000 gallons per day, and a maximum day use of 23,460,000 gallons.

The wells and treatment plant are relatively new, and should be a viable water source and treatment plant for many years. New wells would be relatively easy to locate and the treatment facility has the potential to be expanded.

**MOUND CITY**

The city of Mound City is served by 2 shallow gravel walled wells located in the fringe of the Missouri River alluvium and are moderate producers. The wells serve the city and most of Holt County PWS #1. The city has abandoned 2 wells due to low production. The existing wells were drilled when the new water treatment plant was built less than 10 years ago. During the times when farmers are pumping irrigation water and when hunters are flooding their hunting areas the water level in the city wells is lowered. During this time, when the city runs their wells the water pumping level is within the area of the well screen. Pumping with the water level within the well screen can cause the well screen to plug and reduce the volume of water the well produces. This will also cause the city to need to do costly acidification of the well to clean the screen in order to maintain production capacity. Pumping rates should be reduced so that the water level remains above the well screen at all times. The city may need to locate and drill additional wells

### **Mound City continued**

in order to maintain production capacity. The source could be expanded to provide water on a regional basis if additional wells were located and the capacity of the water treatment plant was expanded.

The facility has a current source capacity of 2,880,000 gallons per day a treatment capacity of 720,000 gallons per day, an average use of 170,000 gallons per day, and a maximum day use of 230,000 gallons.

If the type of wells utilized are pumped daily at rated capacity their life expectancy may be reduced, so optimum capacity should not be taken at more than seventy five percent of rated capacity.

With the uncertainty of the raw water source and limited space for plant expansion the city is not in a position to increase its role as a regional supplier of water.

## **OREGON**

The city of Oregon is served by 2 shallow gravel walled wells located on the fringe of the Missouri River alluvium and are moderate producers. The city has abandoned 1 well due to a collapsed or plugged well screen. The water is hard and high in iron. Lime softening is provided. The treatment plant is less than ten years old, and should serve the city for some time. It was originally planned for the city to provide some water to Holt County PWSD #1, but this did not happen for various reasons. The source could be expanded to provide water on a regional basis, if additional wells were drilled and a larger water treatment plant was constructed.

A pump contractor is in the process of looking at abandoned well and thinks that they may be able to install a new liner and well screen so that the well can be salvaged.

The facility has a current source capacity of 972,000 gallons per day a treatment capacity of 432,000 gallons per day, an average use of 175,000 gallons per day, and a maximum day use of 194,000 gallons.

If the type of wells utilized are pumped daily at rated capacity their life expectancy may be reduced, so optimum capacity should not be taken at more than seventy five percent of rated capacity.

With the availability of raw water and space for plant expansion it would be possible for the city to provide some water on a regional basis.

## OSBORN

The city of Osborn is served by 2 shallow gravel walled wells located in the middle of the city. The wells are low producers. The water has an elevated level of nitrates. It does not at this time exceed the MCL, but it is over half the limit and has increased since the wells were originally drilled. The wells serve only the city of Osborn. The location within the city was the only place found to have water when the wells were initially

drilled. It is believed that it would be difficult to locate any additional wells. The city has recently added some storage and improved the disinfection process. The city should be planning for purchasing treated water from another source, since it would be extremely difficult to locate additional wells.

The facility has a current source capacity of 47,000 gallons per day a treatment capacity of 86,400 gallons per day, an average use of 41,000 gallons per day, and a maximum day use of 41,000 gallons.

If the type of wells utilized are pumped daily at rated capacity their life expectancy may be reduced, so optimum capacity should not be taken at more than seventy five percent of rated capacity.

The source availability would not be adequate for the system to be a supplier of a regional system.

## PATTONSBURG

The city of Pattonsburg is served by 4 shallow gravel walled wells. The city has had to abandon 3 wells due to low production. The wells are located in a flood plain but are protected. The water is high in iron and is relatively hard. The wells require costly routine acidification to maintain production capacity. They are presently able to meet production needs. The water treatment plant is in reasonably good physical condition. The source is not adequate for the city to expand its role as a regional supplier of water.

The facility has a current source capacity of 1,008,000 gallons per day a treatment capacity of 432,000 gallons per day, an average use of 250,000 gallons per day, and a maximum day use of 340,000 gallons.

If the type of wells utilized are pumped daily at rated capacity their life expectancy may be reduced, so optimum capacity should not be taken at more than seventy five percent of rated capacity.

With the uncertainty of the raw water source the city is not in a position to increase its role as a regional supplier of water.

## POLO

The city of Polo is served by 2 shallow gravel walled wells. The city has abandoned several old wells that were located within the city limits. They are of the gravel walled type and are located about 6 miles away from town. They are located in the flood plain, but are protected above flood stage. They are low to moderate producers. Water from the wells is high in iron and manganese and is hard.

The facility has a current source capacity of 432,000 gallons per day a treatment capacity of 108,000 gallons per day, an average use of 55,000 gallons per day, and a maximum day use of 75,000 gallons.

If the types of wells utilized are pumped daily at rated capacity their life expectancy may be reduced, so optimum capacity should not be taken at more than seventy five percent of rated capacity.

The wells require costly routine acidification to maintain production capacity. The water treatment facilities are in need of replacement. The source and treatment facilities are not adequate for the city to become a regional supplier of water.

## RAVENWOOD

The city of Ravenwood is served by 2 shallow gravel walled wells. The wells are low producers and the water is high in iron and manganese. Additional wells may be difficult to locate and would be expected to be low producers. The system has very little excess capacity. The city needs to provide for treatment of water plant residuals. The city needs to be considering upgrade or replacement of the source and treatment facilities or purchasing treated water from another source. The source is not adequate to support the city becoming a regional supplier of water.

The facility has a current source capacity of 216,000 gallons per day a treatment capacity of 100,000 gallons per day, an average use of 35,000 gallons per day, and a maximum day use of 70,000 gallons.

If the type of wells utilized are pumped daily at rated capacity their life expectancy may be reduced, so optimum capacity should not be taken at more than seventy five percent of rated capacity.

The wells require costly routine acidification to maintain production capacity. The city does have a small amount of excess capacity, however the source and treatment facilities are not adequate for the city to become a regional supplier of water.

## ROCK PORT

The city of Rock Port is served by 3 shallow gravel walled wells. The wells are moderate producers. The water is high in iron and is hard. They serve the city of Rockport and Atchison County PWSD #1. Presently the water system has the need to expand in order to serve a potential large user. Additional wells in the area are possible, and a new water treatment plant of higher capacity could be built. If the system were expanded they could enlarge their role as a regional supplier of water.

The facility has a current source capacity of 1,400,000 gallons per day a treatment capacity of 750,000 gallons per day, an average use of 280,000 gallons per day, and a maximum day use of 400,000 gallons.

If the type of wells utilized are pumped daily at rated capacity their life expectancy may be reduced, so optimum capacity should not be taken at more than seventy five percent of rated capacity.

The water treatment plant has only a single very old solids contact basin making repairs difficult, is in need of major rehabilitation or total replacement. However, with the availability of raw water and if a new location were acquired for building a new water treatment plant it would be possible for the city to provide some water on a regional basis.

## ROSENDALE

The city is served by 4 shallow gravel walled wells, all of which are low producers. The raw water is high in iron and manganese, and relatively hard. They are located in an area that has flooded in the past. Two of the wells have not worked since the flood of 1993, one is producing only 10 gallons per minute and the other is producing 35 gallons per minute. They have in the past served water to the city and to Andrew County PWSD #4, but do not now serve the district. They are considering closing down and purchasing water from the water district that purchases from the city of Bolckow.

The facility has a current source capacity of 130,000 gallons per day a treatment capacity of 100,000 gallons per day, an average use of 8,000 gallons per day, and a maximum day use of 19,000 gallons.

If the type of wells utilized are pumped daily at rated capacity their life expectancy may be reduced, so optimum capacity should not be taken at more than seventy five percent of rated capacity. The wells require costly routine acidification to maintain production capacity.

For various reasons, Andrew County PWSD #4 no longer purchases water from the city. The city is also planning to shut the water treatment system down and purchase water

### **Rosendale continued**

from the water district, which is currently purchasing water from the city of Bolckow. The wells and treatment facility are not adequate to supply water for a regional water system.

## **SHERIDAN**

The city of Sheridan is served by two shallow gravel walled wells. The wells are very low producers. The city has abandoned 3 wells due to loss of production. The locating of wells within the area has been difficult and not very productive. There is a problem with ammonia in the raw water, which is indicative of pollution, but there has been no indication of nitrates. The water treatment plant is not of adequate capacity to meet the maximum day demand. The city needs to be active in looking for a source of treated water to supply the needs of the city. The source is not adequate to support the city becoming a regional supplier of water.

The facility has a current source capacity of 144,000 gallons per day a treatment capacity of 43,200 gallons per day, an average use of 24,000 gallons per day, and a maximum day use of 52,000 gallons.

If the type of wells utilized are pumped daily at rated capacity their life expectancy may be reduced, so optimum capacity should not be taken at more than seventy five percent of rated capacity.

The wells require costly routine acidification to maintain production capacity. Maximum daily use is greater than the rated capacity of the treatment system. The source and treatment facilities are not adequate for the city to become a regional supplier of water.

## **SKIDMORE**

The city of Skidmore is served by 3 shallow gravel walled wells. The wells are low producers and the water is high in iron and manganese. The city has abandoned 2 wells due to loss of production or screen failure. Additional wells are not expected to be easy to locate or be other than low producers. The wells must be valved down much of the time to not lower the water level into the well screen area. Pumping at this level would cause plugging of the well screen with iron resulting in the need for costly acidification and eventually require replacement of the well. The water level changes with the level of water in the river located just south of the well field, and in times of reduced rain and runoff the water level drops.

The facility has a current source capacity of 86,400 gallons per day a treatment capacity of 172,800 gallons per day, an average use of 20,000 gallons per day, and a maximum day use of 49,000 gallons.

If the type of wells utilized are pumped daily at rated capacity their life expectancy may be reduced, so optimum capacity should not be taken at more than seventy five percent of rated capacity.

The wells require costly routine acidification to maintain production capacity. The source and water treatment plant needs to be replaced or the city needs to obtain treated water from another source. The source is not adequate to support the city becoming a regional supplier of water.

## TARKIO

The city of Tarkio is served by 4 wells. Two of the wells are shallow gravel walled type and two are drilled into a lower formation. The city has had to abandon at least 5 old gravel walled wells because of reduced capacity. Water from the gravel walled wells is high in iron and hard. Water from the two deep wells is hard and high in sulfates and chlorides. The sulfates and chlorides levels exceed Public Drinking Water secondary limits. Additional gravel walled wells might be difficult to locate and would most likely have a relatively short life expectancy. Also, the water treatment plant is beginning to need major repairs and potential replacement of the solids contact unit. The source is not adequate for the city to become a regional supplier of water.

The facility has a current source capacity of 864,000 gallons per day a treatment capacity of 750,000 gallons per day, an average use of 161,000 gallons per day, and a maximum day use of 240,000 gallons.

The city If the type of source wells utilized are pumped daily at rated capacity their life expectancy may be reduced, so optimum capacity should not be taken at more than seventy five percent of rated capacity. The wells require costly routine acidification to maintain production capacity.

The water treatment plant has only a single solids contact basin making repairs difficult, and it is in need of major rehabilitation or replacement.

The city could if additional water were available from gravel walled wells to blend with water from the two wells that are high in sulfates and chlorides sustain themselves by drilling these wells and building a new treatment facility. Locating additional gravel walled wells is not promising and therefore not practical for the city to provide water on a regional basis.