AGENDA
Dallas Center City Council
December 16, 2020 –6:00 pm

On December 9, 2020, Iowa Governor Kim Reynolds issued an updated Proclamation of Disaster Emergency, which among other matters, encouraged all vulnerable Iowans to limit their activities outside of their home including their participation in gatherings of any size and any purpose. The Governor's Proclamation prohibits indoor meetings of more than 15 people. The Governor further continued the suspension of state laws requiring a public meeting or hearing to the extent the laws could be interpreted to prevent a governmental body from limiting the number of people present for an in-person location of the meeting, providing the governmental body provides a means for the public to participate by telephone or electronically. Compliance with the social distancing requirements for a public meeting would unduly limit the public's participation at a meeting of the City Council. As permitted by Iowa Code Section 21.8 the City Council meeting will be conducted by electronic means. The public is encouraged to access the meeting electronically in the manner specified below.

The meeting will be conducted by Zoom at the following Internet link or telephone numbers: https://us02web.zoom.us/j/84135788167. The passcode is 368794.

If a Zoom user has the Zoom app, just enter the meeting ID 841 3578 8167 and the passcode is 368794.

Or a member of the public may connect to the meeting by telephone using any of the following numbers (the Meeting ID is 841 3578 8167#, the passcode is 368794): Dial by your location

+1 646 558 8656 +1 301 715 8592 +1 312 626 6799 +1 669 900 9128

Depending on the caller's long-distance calling plan, long distance charges may apply.

The meeting will originate in the City Hall at 1502 Walnut Street (which will not be open to the public). The Zoom connection will be available starting at approximately 5:50 p.m.

1. Call to Order and Roll Call
2. Action to approve Agenda
3. Sidewalk Improvement Project – 2021
    a. Review December 8th discussions on partial assessment of new sidewalk projects and adjustment to reimbursement fund for repairs and replacement
    b. City Engineer – Engineer's costs to prepare small project preliminary assessments and assessment plats in relation to assessment payments
    c. Discussion and possible action to proceed with or to defer calendar year 2021 sidewalk project
    d. Possible action on directions to City Engineer
4. Council Work Session with Engineer on the Municipal Water System
5. Action to set public hearing on the FY 2020-2021 budget amendment for January 12, 2021 at 7 pm
6. Adjournment

Cindy Riesselman, City Clerk

May 14, 2002

Hambleton moved to approve Resolution 2002-15 – Establishing a Sidewalk Construction Program. The council allocated $10,000 for this program. Beginning July 1, 2002, residential and commercial property owners can install or replace the sidewalk and be reimbursed at a rate of $4.00 per running foot. The money will be awarded on a first-come, first-serve basis. To qualify, property owners have to obtain a sidewalk permit and comply with all ordinances and requirements of the City for such work. The handicap accessible portion of a sidewalk will continue to be reimbursed at $3.75 per square foot. Motion 2nd by Johnson, roll call 5 ayes, 0 nays.

Sidewalk Reimbursement Payments

FY	Amt reimb
2020	$480.00
2019	$268.00
2018	$668.00
2017	$1,699.00
2016	$1,412.00
	$4,527.00

VEENSTRA & KIMM, INC.
3000 Westown Parkway • West Des Moines, Iowa 50266-1320
515-225-8000 • 515-225-7848 (FAX) • 800-241-8000 (WATS)

December 10, 2020

Cindy Riesselman
City Clerk
City of Dallas Center
1502 Walnut Street
P.O. Box 396
Dallas Center, Iowa 50063

DALLAS CENTER, IOWA
WATER SYSTEM PRELIMINARY ENGINEERING REPORT
FOLLOW UP INFORMATION

This letter is a follow up to the discussion at the December 8, 2020 City Council work session concerning the municipal water system. This letter is intended to provide additional information on topics that are likely to be a focus of the upcoming work session to continue the discussion on the municipal water system.

From the discussion at the work session on December 8, 2020 the writer identified the three topics that are likely to be subjects of discussion at the upcoming work session. These items are:

- Water Quality
- Highway 44 Water Main
- Water Treatment Alternatives

WATER QUALITY

One of the focal points for the City Council in considering improvements to the water treatment plant is water quality. As the writer indicated at the work session the City's alluvial water supply is of good quality. This letter is to provide follow up information relative to water quality.

The City is required to test the water from the water system on an ongoing basis. However, the ongoing testing are for only a few select parameters. The City is not required to test the water for a broader range of analytes that provide a more comprehensive overview of water quality.

At the time a new well is constructed the City must sample and test the water for a series of analytes. The tests on an new well provide the best overview of water quality.
The following tabulation shows a summary of the results of the testing completed in October 2020 for Well No. 11. The results for Well No. 11 should be similar to the test results for the three wells.

Analyte	**Well No. 11** (mg/l)
Total Hardness as $CaCO_3$	360
Total Dissolved Solids	400
Total Alkalinity as $CaCO_3$	320
Ammonia Nitrogen as N	<0.05
Nitrate Nitrogen as N	0.43
Nitrite Nitrogen as N	<0.125
Iron	3.5
Manganese	0.19
Chloride	12
Sulfate	21
Silica as SiO_2	20
Sodium	7.4
Magnesium	30
Potassium	7.9
Mercury	<0.0002
Antimony	<0.005
Arsenic	0.002
Barium	0.12
Cadmium	<0.001
Chromium	<0.01
Selenium	<0.01
Thallium	<0.001
Beryllium	<0.002
Copper	<0.01
Lead	0.003
Zinc	0.08

In evaluating water quality the various analytes can generally be grouped into categories for purpose of analysis of overall water quality. The first group of analytes to evaluate is Total Hardness, Total Dissolved Solids and Alkalinity. The hardness of about 350 mg/l as $CaCO_3$ would be indicative of the moderately hard water. This hardness is typical of alluvial water supplies. Many cities with a similar level of hardness do not provide water softening. Cities that provide water softening reduce the total hardness, but not to a level generally between 100 mg/l and 150 mg/l.

The total dissolved solids is an indicator of all of the aggregate analytes in the water supply. Total dissolved solids is generally similar, but slightly higher than the measure of hardness. The current treatment plant using iron filtration and zeolite softening does not noticeably reduce the total dissolved solids. Membrane treatment, such as reverse osmosis, will reduce the total dissolved solids.

A treatment plant using the reverse osmosis process will be designed to reduce the total dissolved solids to the range of about 150 mg/l. Although the reverse osmosis process reduces total dissolved solids to a near zero level, the finished water needs a certain level of total dissolved solids to provide stability. A water with an extremely low total dissolved solids is very difficult to manage from a stability perspective. A water with extremely low total dissolved solids tends to be very corrosive. Operating a municipal water system with a finished water total dissolved solids that is extremely low increases the amount of metal corrosion and can create issues such as damage to pipes and unacceptable levels of lead and copper in the distribution system.

Overall, the total dissolved solids and hardness level of the City's water supply would be considered typical of an alluvial water supply that could benefit from reducing both hardness and total solids.

The second group of analytes is iron and manganese. Iron results in red water in the distribution system and manganese results in gray or black water. The iron level in the new water main in the range of 3.5 mg/l is above the acceptable level for treated water. Typically, a finished water in the range of 0.05 to 0.3 mg/l of iron is necessary to avoid red water and rusty complaints in the distribution system.

The manganese level of approximately 0.20 mg/l would be considered favorable, but slightly above the finished water goal. Reducing the manganese level to the range of 0.05 mg/l to 0.10 mg/l is considered advisable to avoid black and gray water complaints.

The level of irons and manganese's are very treatable as evidenced by the performance of the existing water treatment plant.

The third category of analytes are the nitrogen series. The three nitrogen compounds are ammonia, nitrate and nitrite. Typically, nitrite levels are very low in a water supply as it is a transitory state. Nitrate levels are of increasing concern in alluvial water supplies. Many shallow well in Iowa are experiencing elevated nitrate levels. The drinking water standard

for nitrate is 10 mg/l. Most treatment plants are not equipped to reduce the nitrate level. The City's nitrate level of less than 0.5 mg/l is well below the 10 mg/l threshold. The City will need to continue monitoring nitrate, but currently nitrate is not a concern.

Ammonia can create issues in a water treatment plant as it combines with the chlorine used for disinfection and complicates the disinfection process. The City's ammonia level of less than the detection limit of 0.05 mg/l would be considered very favorable. The writer would note some cities are experiencing increasing ammonia levels in their wells and the ammonia levels are creating issues regarding plant performance and finished water quality. To date, the City has avoided those issues.

The fourth group of analytes is chloride and sulfate. Both the chloride level and sulfate level in the water supply are very low. The zeolite process does not reduce either chloride or sulfate. The reverse osmosis process will remove both chlorides and sulfates. However, both levels are considered very low and would not require treatment based on their respective levels.

The last group of analytes is the metals. All of the metals concentrations in the water supply would be considered below average for an alluvial water supply. None of the metals pose any concern regarding water quality. The zeolite process does not remove any of the metals. The membrane treatment process removes metals even though the removal of metals is not considered a priority based on their water quality.

In summary, the City's water supply is considered very good quality. There are no inherent water quality violations that would result from the water quality. The water treatment is primarily to improve the atheistic characteristics of the water by removing iron, manganese, calcium hardness, and, if reverse osmosis treatment is used, the overall level of total dissolved solids.

HIGHWAY 44 TRANSMISSION MAIN

As discussed at the work session on December 8, 2020 the City currently has two water mains located along Highway 44 from the water plant to the ground storage reservoir. An 8-inch water main was constructed west of Highway 169 in 1994 and east of Highway 169 in 2000. The 8-inch main carries the finished water from the water treatment plant directly to the ground storage reservoir.

A 6-inch main is located along Highway 44 from the area of the water tower westerly to about Highway 169. This water main is used to supply water to the customers along Highway 44. The 6-inch water main was constructed in the late 1940s when the City moved its water supply and treatment facility to the Raccoon River. Select portions of the water main were replaced in 1980 as part of the Highway 44 project.

It is this water main that is experiencing main breaks and has been identified by Brian Slaughter as requiring replacement or upgrading in the foreseeable future.

The City current utilizes the two water main system based on its system configuration using the ground storage. The water from the treatment plant is pumped directly to the ground storage reservoir. The water pressure in this main is too low to serve the customers along Highway 44. The customers along Highway 44 are served by the 6-inch water main that is connected directly to the distribution system and the water tower.

Prior to 2000 the City operated with only one water main between the treatment plant and ground storage reservoir. When the water treatment plant was pumping the pressure in the main was very low as the water was being pumped to the reservoir. During these periods customers would experience very low water pressure. When the water plant shut off a valve switched the main to the tower pressure. During the periods when the water plant was not functioning the water pressure was significantly higher.

There were two primary reasons the City moved away from the single main system. The first reason was the variability in water pressure that created periods of time with unsatisfactorily low water pressure. The second factor was the occasional failures of the control valve. When the valve did not switch properly there were events when the customers along Highway 44 had essentially no water pressure after the water treatment plant shut off.

The City currently has a 300,000 gallon elevated storage tank. The ground storage reservoir is a 60-foot diameter tank with a maximum water level of just over 14 feet as originally designed. The ground storage reservoir has a maximum capacity of just less than 300,000 gallons. The amount of water that is stored in the ground storage reservoir has varied over time, but generally the ground storage reservoir has not been operated at its maximum capacity.

Historically, the Iowa Department of Natural Resources recommended a city have storage equal to the maximum day pumpage. About 15 years ago the Iowa Department of Natural Resources started to transition to a requirement of storage equal to average day pumpage. This change was primarily to reflect a concern regarding water age. If a city has excessive storage volume the average age of the water in the system increases. Increasing water age can result in deterioration of the water quality.

The City of Dallas Center's water quality is such that deterioration over time is minimal. While water age is a very significant concern for some water systems it is less of a concern for Dallas Center due to the quality of its water supply.

The average daily pumpage over the last six years has been 217,000 gallons per day. The typical peak day each year is normally between 400,000 and 500,000 gallons. For two of the last six years there has been one day with pumpage in the range of 625,000 gallons.

Based on the current standard of average day pumpage both the ground storage reservoir and the elevated storage tank by themselves would be considered just above the recommended storage volume. The combined volume of up to 600,000 gallons would be considered well in excess of the recommended standard for storage.

It is understood the primary reason the City constructed the ground storage reservoir is the capacity of the old water tower was significantly below the recommended capacity. When the ground storage reservoir was constructed that volume combined with the water tower would have been about equal to the recommended storage volume of peak day.

The City has continued to operate both facilities even though the volume of the water tower increased with the new tower constructed in 2008 and the change in the Iowa Department of Natural Resources standard from peak day to average day storage volume.

City staff has strongly preferred to use both the ground storage reservoir and the tower. Operating both facilities provides a significant amount of flexibility and redundancy.

Assuming the City is not planning to return to the former operating concept of a single water main with the water plant pumping to the ground storage reservoir, there are two alternatives to consider.

Alternative 1 would be to maintain the current configuration of the water plant pumping to the ground storage reservoir and replacing the 6-inch water main that supplies the residences along Highway 44. The writer has suggested if the City adopts this alternative and replaces the 6-inch water main it may be prudent to consider constructing an 8-inch water main. An 8-inch water main would have the ability to serve as an alternative water main in the event there were a problem with the primary 8-inch water main. The writer recognizes that using the new distribution main to pump to the ground storage reservoir would result in pressure issues for customers along Highway 44. Nonetheless, those issues appear to be more manageable than having no transmission main capability.

The estimated cost for replacing the transmission main is in the range of about $1,200,000. The timing of this project is based primarily on the maintenance history and breakage experienced on the 6-inch water main that is now slightly more than 70 years old.

Alternative 2 would be to change the concept of operating the water system to pump from the water plant to the water tower. Under this strategy the ground storage reservoir would no longer be a critical element of the distribution system. The City might elect to keep the ground storage reservoir for backup, but it would be difficult to use the ground storage reservoir on a regular basis under this situation.

Under this alternative the customers currently connected to the 6-inch water main would be transferred to the existing 8-inch water main.

This alternative utilizes the single main concept rather than the dual main concept. However, under this alternative the control and pressure issues associated with the old one pipe alternative would not be present. Because the water plant pumps directly to the tower the customers along Highway 44 would see about the same or slightly higher pressure than they currently experience.

Under this alternative when the water plant is not operational the pressure in the distribution system would be identical to the current pressure.

When the water plant is operational there would be a slightly higher water pressure caused by the friction loss in the water flowing from the water plant to the water tower. The greatest increase above the current pressure would be at the west end of the water main and very little pressure change would be observed closer to the developed area of the City.

The pressure differential would vary with the pumping rate. At a 200 gpm pumping rate the pressure increase when the water plant would be operational would be a maximum of 6 psi. If the pumping rate increased to 400 gpm under peak conditions the pressure increase would be as high as 22 psi just east of Highway 169.

The pressures in the western part of the main along Highway 44 are already at elevated levels. Just east of Highway 44 the ground elevation ranges from 1,000 to 1,040. The tower overflow elevation is 1227.25. The tower elevation results in distribution system pressures between 80 and 100 psi in some areas. The recommended maximum pressure in the distribution system is 100 psi. If the City adopts this alternative it may be necessary for some of the customers along Highway 44 to install a pressure reducing valve.

The writer would note the decision whether to select Alternative 1 or Alternative 2 does not impact the water treatment plant alternatives. However, the selection of the alternative can affect the total cost to the water system improvements.

Under Alternative 2 it would not be necessary for the City to incur the cost to replace the 6-inch water main. The City would incur some additional cost to change the pumps at the water plant, but that cost would be significantly less than the cost of the replacement of the 6-inch water main.

Although there are only two basic alternatives the City has the option to select one of three choices. Choice 1 would be to select Alternative 1 and construct the new 6-inch water main within the next few years as identified in the Capital Improvement Program. Choice 2 would be to select Alternative 1, but to defer improvements to the 6-inch water main at least until after the water tower debt has been retired about 2029. Choice 3 would be to adopt Alternative 2. If the City adopts this alternative the change would be incorporated at the time the water treatment plant is upgraded.

WATER TREATMENT TECHNOLOGY

The discussion at the December 8, 2020 meeting seemed to indicate the majority of the Council is in favor of the City transitioning to reverse osmosis treatment to replace the existing zeolite softening. The issues yet to be addressed are the timing of the project and the basic strategy for the water treatment plant.

With respect to reverse osmosis membrane treatment process the biggest factor that impacts the design strategy is the iron concentration in the water. The iron concentration is anticipated to be in the range of 3 mg/l to 4 mg/l. Some manufacturers of reverse osmosis equipment are not capable of treating 3 mg/l water and those systems require filtration prior to reverse osmosis. Other manufacturers have a product that can remove that level of iron in the raw water and do not require filtration prior to the reverse osmosis.

The ability to remove iron with or without filtration is only one factor to address. Another factor to address is the finished water iron level. For any reverse osmosis treatment plant a portion of the water is routed through the reverse osmosis unit and a portion of the water is bypassed around the reverse osmosis units. The reverse osmosis units reduces the total dissolved solids level to a level that is too low to utilize in the distribution system. A portion of the water is blended around the reverse osmosis units to achieve a finished total dissolved solids level that is acceptable.

For example, if the raw water has a total dissolved solids of 400 mg/l and the goal is to produce a water with a total dissolved solids of 150 mg/l, approximately 65% of the water will be routed through the reverse osmosis units and 35% of the water will bypass the reverse osmosis units and will be blended directly with the processed water to achieve the desired finished water quality. The water that is bypassed around the reverse osmosis units will have the original iron level unless there is filtration prior to reverse osmosis.

For the treatment alternatives that do not have iron filtration prior to reverse osmosis the 3 mg/l of raw water iron could potentially results in a finished water iron level in the 1 mg/l range. This level if iron is considered too high as it has the potential to create red or rusty water within the distribution system.

Another factor to consider is the waste stream from the reverse osmosis process. For many reverse osmosis system up to 30% of the water that passes through the unit is a waste stream that must be disposed of. When there is a high iron level being removed in the reverse osmosis units the waste stream can have the same color issues as the current iron filters. It was the color issue that required the City to pump the backwash water to the wastewater treatment lagoon.

For the reverse osmosis concept that uses filtration prior to reverse osmosis the iron backwash water is handled in the same manner as currently handled with the backwash pump storage and pumping system. With the iron removed prior to reverse osmosis the waste stream from the reverse osmosis units can probably be permitted to discharge directly to the Raccoon River. With filtration the waste stream issues are more easily addressed by segregating the colored iron backwash water from the reverse osmosis waste stream.

For the reverse osmosis process that removes iron as part of the process the waste handling issues are much more significant as the waste cannot be discharged directly to the river. That waste would need to be pumped to the lagoon system and would require a significant increase in the capacity of the backwash system and would increase the flow to the lagoon system. The reverse osmosis waste stream would reduce the available capacity at the lagoon system to accommodate future growth.

With respect to the water treatment process there are two basic strategies that could be pursued. Strategy No. 1 would be to utilize filtration prior to reverse osmosis. Under this approach the water treatment plant building would be expanded easterly and the reverse osmosis units installed. Once the reverse osmosis units are installed and would be operational. The softeners can be removed from the building. At that time the west iron removal filter can be replaced.

The center and east filters in good condition would not require replacement at this time. By removing the zeolite softeners there is space available to remove and replace the remaining two filters at a future date using the space now occupied by the softeners. That space would be available for additional filters or potentially additional reverse osmosis units at a future date.

Under this approach the backwash from the filters would be handled in the same manner as the current system. The waste stream from the reverse osmosis units would be discharged directly to the river under a NPDES permit.

Under Strategy No. 2 the water treatment plant would utilize the reverse osmosis technology that would not require separate filtration. Under this approach the building would be expanded easterly. The reverse osmosis units would be installed in the new building area. After the reverse osmosis units are in service the existing filters and softeners can be removed. The space currently occupied by the filters and softeners would be available for future reverse osmosis units as plant capacity expands with growth.

Under this strategy the waste handling system would need to be significantly expanded in storage capacity to accommodate the continuous waste stream from the reverse osmosis units.

Under Strategy No. 2 it may be necessary to reduce the finished water total dissolved solids to the lowest possible level to reduce the iron level in the finished water.

There are advantages and disadvantages to both strategies. From an operational perspective there is simplicity to the single process concept of only using reverse osmosis. On the other hand, the approach under Strategy No. 2 creates significant issues such as the finished water iron level and the handling of the backwash.

Based on current technology it would appear the disadvantages of Strategy No. 2 may outweigh the advantages of the strategy and point toward the use of Strategy No. 1 involving continued filtration prior to reverse osmosis with the replacement of the west filter as part of the project.

The technology regarding reverse osmosis water treatment is advancing at a fairly rapid pace. If the City Council were to select Strategy No. 2, and if a new product technology is developed before the project moves forward the City could reconsider that strategy prior to undertaking the project.

With respect to the water treatment plant the critical issues for the City Council is to determine they wish to move forward with the project that would transition from zeolite softening to reverse osmosis treatment and to identify a timeline for the project.

Based on the advantages and disadvantages the writer would anticipate planning for the project would move forward of using filtration and reverse osmosis and would continue with that approach unless a new technology becomes available that would eliminate the disadvantages of direct reverse osmosis treatment.

If you have any questions or comments concerning the project, please contact the writer at 225-8000, or at bveenstra@v-k.net.

VEENSTRA & KIMM, INC.

H. R. Veenstra Jr.

HRVJr:paj
212176
cc: Brian Slaughter, City of Dallas Center
Ralph Brown, Brown, Fagen, & Rouse