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MEMORANDUM

Date: November 12, 2024
To: Justin Wagner, Utilities Manager
From: Seth A. Peterson, P.E. (MN, WI)
Subject: Northfield Water Treatment Plant
City of Northfield, MN
Project No.: 0M2.123279

There has been recent discussion regarding pressure filters as a treatment option for the proposed water treatment facility. The water study did note pressure filters per the following statement:

“Other treatment options were considered other than the three options listed above such as pressure filters, ion exchange and new source water (wells). However, the City’s goal to have a long life facility that’s sustainable and able to treat the existing source water and meet all drinking water standards and provide future treatment flexibility, only the three options listed.. were fully evaluated’

Pressure filters do not make sense for a facility that has a capacity of 5,500 gallons per minute (gpm). The reason is that there is additional maintenance required on the pressure filters approximately every 15 years where the vessels need to be rebuilt, and media replaced. Over the course of a 60+ year period, these costs make it less economical than gravity filtration. We typically see the breakeven point for gravity vs pressure filtration at approximately 1,000 gpm. As noted above, the proposed facility will have a capacity of 5,500 gpm. Pressure filters also have less operational flexibility than gravity filters. With gravity filters the operations staff can visibly see the water in the filters and adjust chemical feed, water rates, backwashing, etc. Due to the nature of the pressure filters, the operators have no idea what is going on inside the pressure vessel. The proposed design includes aerators to help volatilize any gases in the water supply and assists with starting the oxidation process without any chemical addition. Aeration will remove gases such as radon and ammonia, both naturally occurring gases in ground water. Removal of these through aeration makes the facility safer for operations staff and aids in treatment of the water. Pressure filters do not have the benefit of aeration and require chemicals for all oxidation.

There was information shared with me on a proposed pressure filter system with a proprietary media. A proprietary media may lead to increased operation costs in the future when replacement is required. My recommendation is to stay away from a proprietary media and use media that is readily available and is known to work such as anthracite and greensand media. The anthracite and greensand media were tested through a pilot study and found to be very effective in removal of manganese and iron. The proposed treatment facility has anthracite and greensand media for the gravity filters.

Additionally, as the City was deciding to include reverse osmosis (RO) as a treatment option, pressure filters make little sense as the discharge from the filters must enter a clearwell before going to the RO treatment. Breaking the pressure cycle minimizes the benefit of the single pump through system for

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pressure filters. Additionally, it should be noted that the inclusion of RO treatment will soften the water for all water users in Northfield providing a significant benefit and substantial water quality benefit. Additionally, RO will protect the City from future issues such as PFAS and any other emerging contaminants. The addition of RO will also reduce the amount of chloride discharged to the wastewater treatment facility (WWTF) and ultimately to the Cannon River. Chlorides are a current limit at some WWTFs across Minnesota, however, Northfield currently does not have a chloride limit.

I understand the City may want to look at ways to reduce costs for the proposed water treatment facility. The main option would be to remove the RO from the treatment facility. This would reduce costs but would require re-design work to redo the building, site work, etc. It is expected that the design to incorporate a change of this nature would take roughly 4 – 6 months. It should be noted that costs will be more expensive in 4 – 6 months. Additionally, the City has done analysis on the cost benefit for the inclusion of reverse osmosis against the cost of residents having home water softeners. Based on the City's analysis, residents will be paying roughly \$8 per month for the reverse osmosis system where home water softeners cost residents roughly \$19 per month.

While I understand the reasoning for trying to reduce costs, the proposed water rates are comparable to other communities with similar water treatment and are reasonable based on what I have seen in other communities. Additionally, the Minnesota Department of Health and Public Facilities Authority have a formula for affordable water rates, and they use 1.2% of the Median Household Income (MHI). The current MHI for Northfield is \$83,125 and 1.2% equals \$83.13 per month. The proposed rate of \$54 is well below the affordability threshold for water service per state standards. Northfield has done a great job of financially positioning for this project and keeping user rates low in comparison to other communities with new WTP.

It should be noted that any community that installs a water treatment facility is never disappointed as they get better water quality and there is less maintenance needed within the system due to the treated water.

Based on the above information, my recommendation is for the City to move forward with gravity filters and reverse osmosis as the treatment option.