WATER SYSTEM DISINFECTION OPTIONS

City Council Workshop – March 4,2019

Agenda

- Briefly Discuss other potential threats to water system (10 minutes)
- Reference to Results of Peer Survey on Disinfection Methods (5-10 minutes)
- Reference to Matrix of Various Disinfection Options, Effectiveness, and Costs (5-10 minutes)
- Staff Recommendation (5-10 minutes)
- Financial Impacts (5-10 minutes)
- Council Discussion/Q & A (40 minutes)
- Next Steps:
  - No decision requested at this time
    - Council is requested to endorse staff recommendation for final consideration at regular Council meeting in April
  - Hold Educational Public Open House in partnership with MDH in late March
  - Final decision considered at regular Council meeting in April

Other Threats - Perfluoroalkyl Substances (PFAS)

- Source – disposal of PFAS production waste in unlined landfills, allowing PFAS to leach into aquifer
- Formula used by MDH to compute Health Index (HI) value may be adjusted by MDH in near future
  - Announcement anticipated in March
- Sampling of Hastings Municipal wells indicate fairly steady readings
- HI Value of 1.0 or greater required to be addressed
  - Hastings current maximum computed value on any well as of most recent testing was 0.66 of HI
  - All other wells most recent analysis results were 0.45 or lower
- If/When new HI is set, sampling must be conducted for four consecutive quarters to establish Hastings' wells' track records under new regulation.
- If in the intervening months Hastings' value exceeding new limit, there may be alternatives other than treatment that can bring values below limits.
  - For example – does blending of water from multiple sources within existing distribution system result in at-tap levels that are within regulatory limits?
- If treatment becomes required, Granular Activated Carbon (GAC) is leading technology, and can be implemented at well site or in combined source treatment facility
  - 3M Settlement money available from State of MN for implementation costs
  - Cottage Grove Example
  - GAC Technology is effective for removal of other types of pollutants, <u>but not for nitrates</u>

Other Threats - Nitrate

- Source of Contamination = breakdown of fertilizer components as water infiltrates into soil and aquifer
- Aquifer flow pattern generally from southwest to northeast
- Maximum Contaminant Level set by MDH is 10.4 mg/L
  - Wells No. 3 & No. 5 currently treated at WTP (since 2007)
    - Plant construction cost was approximately $3 Million, with annual operating expense ≈ $100,000
    - Treatment plant uses Ion Exchange technology, similar to giant water softener
    - Nitrate level leaving plant is typically 4-5 mg/L
  - Wells No. 4 & No. 7 typically read levels of 4-7 mg/L
  - Wells No. 6 & No. 8 typically read levels in 8-9 mg/L range
- If necessary, WTP No. 2 could be constructed on site of Well No. 6
  - Infrastructure already in place to transport water from Well No. 8 directly to site (since 2006)
- GAC technology can be integrated with nitrate removal treatment system if necessary for removal of other contaminants

Disinfection - What do other cities do?

- Inver Grove Heights – pop. 35,400
  - Gas, since 1998
- Northfield – pop. 20,040
  - Gas, since 1962
- Lakeville – pop. 63,750
  - Gas, since 1997
- Burnsville – pop. 61,450
  - Liquid Sodium Hypochlorite since 2015, chlorination of various types since 1970's
- West St. Paul – pop. 19,770, & Mendota Heights – pop. 11,340
  - Served by St. Paul Regional Water Services (City of St. Paul)
  - Gas for initial treatment, ammonia/chloramine prior to distribution
  - Chlorination since 1930's
- Vermillion – pop. 425
  - Gas since 1992, liquid from 1987-1992
- Woodbury – pop. 69,760
  - Gas, since early 1980's
- Apple Valley – pop. 52,440
  - Gas, since 1960's
- Eagan – pop. 66,630
  - Gas, since 1970's

Survey of Other Cities' Disinfection Methods

Water Disinfection Method Survey of Nearby Communities

City	Population Served	Chlorination Used?	Current Method	Since	Amount of Taste/Smell Complaints
Northfield	20,040	Yes	Gas	1962	Very few since tracking began in 2016.
Inver Grove Heights	35,400	Yes - all water processed at centralized treatment plant. Disinfected prior to filtration and after filtration.	Gas	1998	27 documented complaints from 2017-2018. Vast majority were when faucets were first turned on by the customer for the day, after water had been sitting in lines overnight. Far fewer calls today than when treatment plant first opened.
Lakeville	63,750	Yes	Gas	1997	Very few complaints. Approximately 1 per month average.
Burnsville	61,450	Yes. Chloramine from 1970's to 2008, Chlorine gas from 2008-2015, and Sodium Hypochlorite (liquid) since 2015.	Liquid - City makes its own Sodium Hypochlorite on-site.	1997	Very few complaints. No tracking, but estimate only a couple each year.
West St. Paul - Served by St. Paul Regional Water Services (City of St. Paul)	19,770	Yes. Two forms currently used. Gas Chlorine at front end of treatment train, Amonina to form Chloramine at end of treatment train.	Gas, and Chloramine	1930's	Rare - one complaint to SPRWS in 2017 and 2018
Mendota Heights - Served by St. Paul Regional Water Services (City of St. Paul)	11,340	Yes. Two forms currently used. Gas Chlorine at front end of treatment train, Amonina to form Chloramine at end of treatment train.	Gas, and Chloramine	1930's	Rare - one complaint to SPRWS in 2017 and 2018
Vermillion	425	Yes. Initially treated with liquid chlorine solution from 1987-1992. Changed to gas method in 1992.	Gas	1987	Rare
Woodbury	69,760	Yes	Gas	Early 1980's	Rare - a few complaints each year.
Apple Valley	52,440	Yes	Gas	Since 1960's	Infrequently
Eagan	66,630	Yes	Gas	Since 1970's	17 complaints on record in 2018

Informational Matrix

City of Hastings

Water System Disinfection Alternatives Analysis

Alternative	*Provide Residual Protection in Distribution System by itself?*	*Additional Disnfection Implements Needed for Distribution Protection?*	*Risks of Microbiological Contamination Reduced?*	*Physical Space/Facility Modification Needs*	*Can Additional Treatment Types (i.e. Nitrates, PFCs) be integrated afterward?*	*Operational Management Effort*	*Initial Capital Costs**	*Annual Operational Costs*	*Capital Cost when paired with method for residual protection*	*Annual Operational Cost when paired with method for residual protection*	*Costs per singular action*
Chlorine Gas	Yes	No	Yes - continual protection.	Small to Modest, depending on facility	Yes - easily configured. System can be designed in anticipation of future treatment methods.	Low - dosing levels can be set and do not require frequent checking.	$351,000	$44,000	N/A	N/A	N/A
Sodium Hypochlorite (Liquid)	Yes	No	Yes - continual protection.	Small to Modest, depending on facility	Yes - easily configured. System can be designed in anticipation of future treatment methods.	Low to moderate - management of dosing levels requires more attention than Gas option.	$155,000	$99,000	N/A	N/A	N/A
Ozone	No - eliminates pathogens and microbiological contaminants only from source water.	Yes - required by standards.	Only when paired with method for protection in distribution system.	Small to Modest, depending on facility	Yes. Moderate to significant impact depending on size, scale, and type of additional treatment.	Significant	$3,000,000	$104,000	$3,155,000 to $3,351,000	$148,000 to $203,000	N/A
Ultraviolet Light	No - eliminates pathogens and microbiological contaminants only from source water.	Yes	Only when paired with method for protection in distribution system.	Significant	Yes. Moderate to significant impact depending on size, scale, and type of additional treatment.	Moderate	$750,000	$22,000	$905,000 to $1,101,000	$66,000 to $121,000	N/A
Shock Chlorination	No - temporal and performed only once or twice annually.	No	No. This method does not offer continual protection.	None	N/A	Moderate and intermitent - intense staffing needs during operation, with significant communcations efforts.	N/A	N/A	N/A	N/A	Estimated $10,000 of staffing costs and chemicals
Filtration	No - removes contaminants only from source water.	Yes - required by standards.	Only when paired with method for protection in distribution system.	Small to Modest, depending on facility	Yes. Moderate to significant impact depending on size, scale, and type of additional treatment.	Low to moderate depending on type of filtration.	$15 to $20+ Million, depending on type**	$50,000-$120,000 (sand filtration) Minimal for membrane filtration, but periodic replacement of membrane is required ($600,000)	$15.2-$20.5+ Million	$100,000-$220,000 (sand filtration) $50,000-$100,000 (membrane filtration) Periodic membrane replacement ($600,000)	N/A
Ongoing Comprehensive Inspection & Enforcement	No	N/A	No, but likelihood of discovering potential risks is increased.	N/A	Yes. Moderate to significant impact depending on size, scale, and type of additional treatment.	Significant - requires examination of all private plumbing work on 7,800+ served properties in the City. Requires intense efforts in scheduling visits to properties, and consent of owners.	None	Significant - would require several full-time staff dedicated to task.	N/A	N/A	N/A
Do Nothing	No	N/A	No	None	N/A	None	None	None	None	None	N/A

***Does not include design and project management overhead costs, which range from 15%-30% and depend on the variable characteristics of each site where implementation is being made.*

****Membrane filtration requires extensive operational efforts and costs, and process results in up to 30% of source water being sent to waste. Sand filtration system requires large amount of space, but minimal operation and maintenance efforts.*

Staff Recommendation: Gas Chlorination

- Rationale:
  - Highly effective at protecting against microbial contamination threats while water is in transport from source to tap
    - One of only two methods available that provides such protection
  - Proven and safe technology with widespread use and great track record
    - Leaks are very rare – less than one leak/year in all of MN, all have been localized and not required evacuations
  - Consistent chlorine concentrations, which can help minimize taste/odor experiences
    - Note: taste and odor sensitivity widely varies from person to person
  - Risk of recurrence of contamination are unknown, but vulnerability, and consequences are both large on a system of Hastings' size
    - Impacts to social bottom line are many times the cost of physical protection
  - MDH Recommends permanent ongoing disinfection
  - Systems can be designed to account for future integration with other treatment implements should they be necessary
  - Lower operations and maintenance efforts compared to liquid chlorination method
  - Lower long-term operational costs than liquid chlorination method
- Approximate Capital Cost** = $440,000
- Approximate Annual Operating Cost = $44,000

***Includes engineering and project management overhead of 25%*

Financial Impacts

- Several Options
  - WAC Cash + 2019 Budget Amendment (Water Fund)
  - 2019 Budget Amendment (Water Fund) + Debt (Revenue Bonds)
  - 2019 Budget Adjustment (Water Fund)

Financial Impacts

- ***Option 1- WAC cash plus budget amendment***
- Water Access Charge (WAC) is received when a property is developed. The purpose of WAC is to help with the cost of infrastructure items for the Water system.
- Current WAC balance is $436,312
- Use $350,000 of our WAC cash for the bulk of the project, allocate an additional $90,000 from our Water fund balance.
- This option has the smallest impact on our Water fund over the next several years. Anticipate a 5% to 6% increase for 2020, which is the same as it would be without the gas chlorination system.

Financial Impacts

- ***Option 2- 2019 Budget Amendment (Water Fund) + Debt (Revenue Bonds)***
- Take out a ten year bond for $350,000, allocate an additional $90,000 from our Water fund balance.
- Would have some additional expense for bonding (up to $10,000)
- This option is increasing the Water Funds future liability in the form of a debt payment. Initial projections show a 6% - 7% increase request for 2020 to keep the fund Water fund balance healthy over the next several years.

Financial Impacts

- ***Option 3- 2019 Budget Adjustment (Water Fund)***
- Allocate the entire project to the water fund expense $440,000.
- This would be using fund balance for the entire project.
- Staff does not recommend this option, the Water fund does not have enough cash to stay above levels recommended by our fund balance policy if it uses this much cash. This could cause large rate increases to be requested in 2020.

Next Steps

- No decision requested at this time
  - Council is requested to endorse staff recommendation for final consideration at regular Council meeting in April
- Hold Educational Public Open House in partnership with MDH in late March
- Final decision considered at a regular Council meeting in April

Questions?