



Drinking Water System Switch to Free Chlorine Disinfection

Disinfection of Drinking Water

- Regulations require a persistent residual concentration of a disinfectant in the distribution system
- Necessary to control growth of bacteria
- Two approved methods exist for distribution system residual disinfection --- Chlorine or Chloramine
- Chlorine is first choice and most widely used around the world

- We currently use chloramine
- Chloramine formed by combining chlorine with ammonia

Why Use Chloramine?

- Pre 1985 - surface water intake located at foot of Huron Street in shipping canal
- Source water contained trace concentrations of phenols
- Chlorine mixing with phenols creates objectionable taste and odour compounds in the treated water

- Now intake at Gros Cap – phenols no longer an issue
- Chloramine no longer necessary

- Current operating costs for Ammoniation ~ \$35,000 per year

Why Switch to Free Chlorine?

- 2008 - started upgrades to the wells to satisfy regulatory requirements for disinfection
- Ammonia injection relocated to end of contact mains
- Scaling of ammonia injection lines now requires costly remediation every 2 to 3 months - about \$360,000 per year
- Water softening equipment required to minimize scaling -- costs estimated at – Capital \$810,000 + Annual O&M \$30,000
- Corrosion control required under current regulations to address lead in drinking water – Capital \$1,260,000 + Annual O&M ~ \$55,000
- Total added costs - Capital ~ \$2 million + Annual O&M ~ \$85,000
- Eliminating ammonia will avoid cost of softening, may avoid need for corrosion control and should correct taste related concerns (in the east end of town)

Stantec Feasibility Study Findings – Other Jurisdictions

Table 2: Summary of Other Systems Reviewed

System	Size	Source Water	Date of Conversion	Duration of Conversion
Oakville	165,000	100% Lake Ontario	1999	Permanent conversion
Washington D.C	600,000	100% Potomac River	2010	3 month free chlorine burn
Ann Arbor	120,000	85% Huron River, 15% wells	1992	2 week free chlorine burn

The following is a summary the salient findings from the review of other systems:

- Oakville and Washington DC performed extensive hydrant flushing to facilitate removal of chloraminated water during the conversion. Ann Arbor did not practice hydrant flushing. All three systems experienced short term taste and odour issues due to formation of dichloramine which resolved within a few days.
- Concentration of free chlorine residual leaving the treatment facilities was increased for all three systems for a few days to facilitate breakpoint reactions and to ensure adequate free chlorine residual remained after breakpoint demand.
- Oakville set up temporary dosing to some reservoirs to facilitate rapid breakpoint chlorination, in order to limit taste and odour complaints. Washington DC and Ann Arbor did not spike reservoirs.
- None of the systems experienced significant discolouration issues. Washington DC reported some red water complaints during the conversion, attributed to a combination of the change in Oxidation Reduction Potential causing some destabilization of iron scales, and also hydraulic disturbance of existing sediment due to flushing operations.

Overall, the experience of the other systems reviewed indicates minimum operational problems during conversion from chloramine to free chlorine.

Other Jurisdictions – Annual Chlorine Switch

- Washington D.C. -- City of Ann Arbor, Michigan -- City of Highland Park, Illinois -- City of Arlington, Virginia -- New Jersey American Water, New Jersey -- City of Vero Beach, Florida -- City of Oldsmar, Florida -- City of Melbourne, Florida --- and many more
- In general,
 - Annual “Chlorine Burn” is routine requirement of US state and federal agencies for systems using chloramines.
 - The major anticipated impacts are temporary taste and odour, and discoloured water
 - Jurisdictions such as Washington DC have been conducting these burns for many years
 - No significant issues other than temporary taste and odour complaints already noted

Conversion Process

- Replace entire volume of water in pipes and reservoirs
 - Interaction Free/Combined Chlorine will produce taste and odour compounds that some people may find disagreeable
 - Moving front will pass through distribution system – taste and odour concerns are temporary
 - Discoloured water also possible due to change of flow patterns
- Once conversion complete and system stabilized, most people will not notice any difference in taste of water
- Possibility of loss of disinfection residual during the transition
- PUC working closely with APH and MOE to plan for conversion
- Tentative schedule was to start week of October 17th
- Probably delayed to week of October 24th
- Public notices published in the media daily during conversion and posted on PUC website at: www.ssmpuc.com

Questions?