

Joliet Alternative Water Source Study

Topic #11: Emerging Contaminants and Treatment

What are emerging contaminants in raw water sources?

Emerging contaminants are contaminants that have been detected in raw water sources (sometimes in very small concentrations) which have not been fully tested or studied for health effects, so their risk is unknown. (https://www.usgs.gov/mission-areas/water-resources/science/emerging-contaminants?qt-science_center_objects=0#qt-science_center_objects) (<https://www.epa.gov/wqc/contaminants-emerging-concern-including-pharmaceuticals-and-personal-care-products>)

These emerging contaminants are not necessarily new in the raw water sources, they have likely been around for a while, there is just new awareness and new laboratory testing capability to detect them at much lower limits (nanograms per liter versus milligrams per liter).

No water is 100% pure and no new water is created. We learned about the water cycle in grade school – its journey as a liquid, gas or solid. (<https://earthobservatory.nasa.gov/features/Water>) Even the groundwater that the City currently uses for its drinking water source was once surface water runoff. And as it takes this never-ending journey, it has the potential to build up what it encounters along its journey.

Emerging contaminants are important because the risk they pose to human health and the environment is not yet fully understood. There are several emerging contaminants that are being considered for regulation both at the federal and state levels.

Some of the emerging contaminants currently being tested and considered for regulation include:

- Pharmaceutical and Personal Care Products (PPCP)
- Endocrine Disruptors (EDC)
- Perchlorate
- 1,4 Dioxane
- 1,2,3-trichloropropane (TCP)
- Trichloroethene (TCE)
- Microplastics
- Pre- and poly- fluoroalkyl substances (PFAS)
- Hexavalent chromium
- Cyanotoxins
- N-Nitrosodimethylamine (NDMA)

How do you treat emerging contaminants?

Treatment for these emerging contaminants is a bit tricky. First, emerging contaminants have not yet been thoroughly studied so there isn't a comprehensive list of treatment methods for all emerging contaminants. In addition, there are hundreds of emerging contaminants, so testing every contaminant would be difficult and take many years. The best source is research or case studies which may only be focused on certain contaminants and certain treatment methods. Case studies have shown that there is promise for advanced treatment such as reverse osmosis, UV with advanced oxidation and ozone for many emerging contaminants. But, for some emerging contaminants, more traditional treatment methods such as aeration and filtration with granular activated carbon work best for removal.

The American Water Works Association (AWWA) has published a number of case studies for treatment of emerging contaminants. Treatment options for some contaminants, such as PFAS, have shown promising results. However, case studies for removal of other contaminants such as Organics, were not as successful. Researchers and industry professionals are continuing to study this evolving issue.



As part of the Phase II study, raw water sampling of these emerging contaminants is being performed on the possible river water and Lake Michigan sources to determine whether specialized treatment may be required to remove emerging contaminants from the raw water to achieve a safe finished water.

If you want more information on emerging contaminants, consider visiting these sites:

- <https://www.epa.gov/dwstandardsregulations>
- <https://floridadep.gov/comm/press-office/content/regulated-drinking-water-contaminants-and-contaminants-emerging-concern>
- <https://www.safewater.org/fact-sheets-1/2017/1/23/emerging-contaminants>
- <https://www.technologynetworks.com/applied-sciences/articles/emerging-contaminants-in-water-sources-effects-and-treatments-296802>