DEPARTMENT OF HEALTH

Unregulated Contaminants Monitoring Project

PROJECT SUMMARY

About the project

Minnesota Department of Health (MDH) has completed the Unregulated Contaminants Monitoring Project, which tested for chemicals of emerging concern (CECs) in drinking water sources across the state.

MDH collected samples from approximately 100 community water systems (CWSs) in vulnerable and non-vulnerable geologic settings. MDH sampled for perfluoroalkyl substances (PFAS), pharmaceuticals, wastewater indicators, benzotriazoles, and pesticides. A goal of the project was to better understand how susceptible drinking water sources are to certain CECs. MDH conducted sampling in 2019-2021.

Results from the data summary report

Below are some findings, which are described in more detail in the Data Summary Report (PDF) (https://www.health.state.mn.us/communities/environment/water/docs/ucmpreport.pdf):

1. Very few samples exceeded health-based guidance for CECs.

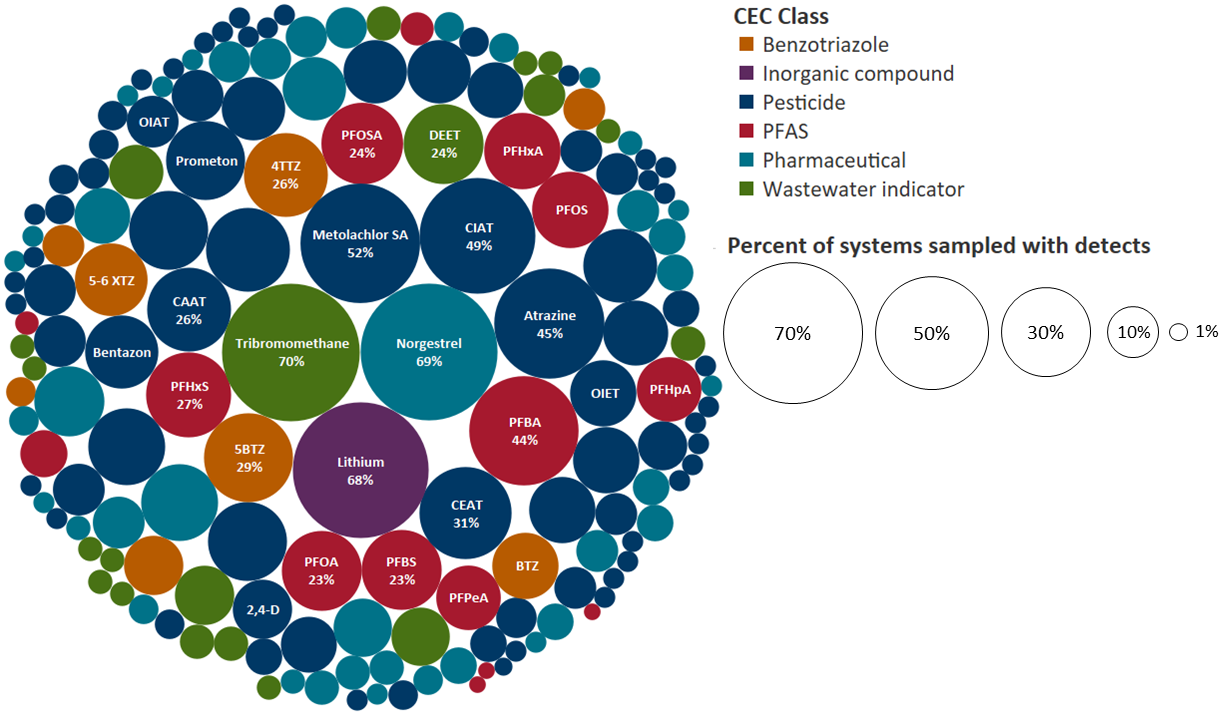
Results were compared against available MDH health-based guidance values. A small number of results exceeded guidance values: six samples exceeded guidance for pentachlorophenol (PCP); two exceeded guidance for bromoform, a disinfection byproduct (DBP); and one system exceeded the Health Risk Index (HRI) for PFAS. MDH staff coordinated with CWSs to collect additional samples. Subsequent samples for PCP had results below the laboratory detection limit. The CWS with the bromoform detection was found to meet Safe Drinking Water Act requirements for DBPs. MDH took follow-up samples at the system with the PFAS HRI exceedance and the system took actions to reduce PFAS levels in finished water.

2. Only a fraction of the CECs analyzed were detected.

Of the 522 distinct CECs analyzed across all water samples collected, 161 (32%) were detected. The majority of CECs were not detected. The CEC detections included 76 pesticides, 41 pharmaceuticals, 20 wastewater indicators, 15 PFAS, 8 benzotriazoles, and 1 inorganic compound.

3. Pesticides and PFAS were generally detected at a greater frequency than other CECs

While certain wastewater indicators and pharmaceuticals were frequently detected within or across networks (tribromomethane and norgestrel), pesticides and PFAS were generally detected at a greater frequency than wastewater indicators and pharmaceuticals.



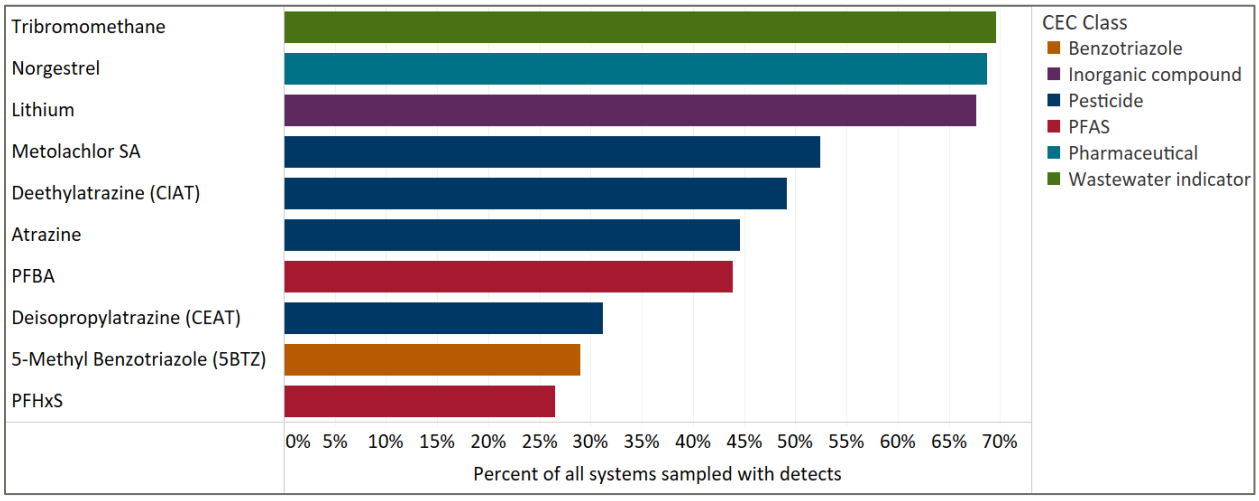
CECs detected at all sites, by class and relative frequency of detection

Each dot represents an individual contaminant within a class, as defined in figure. The size of the dot represents the percentage of sites at which the contaminant was detected, based on the number of sites at which it was analyzed. Five frequently detected contaminants across all sites include: tribromomethane (70%), norgestrel (68%), lithium (68%), metolachlor SA (52%), and CIAT (49%).

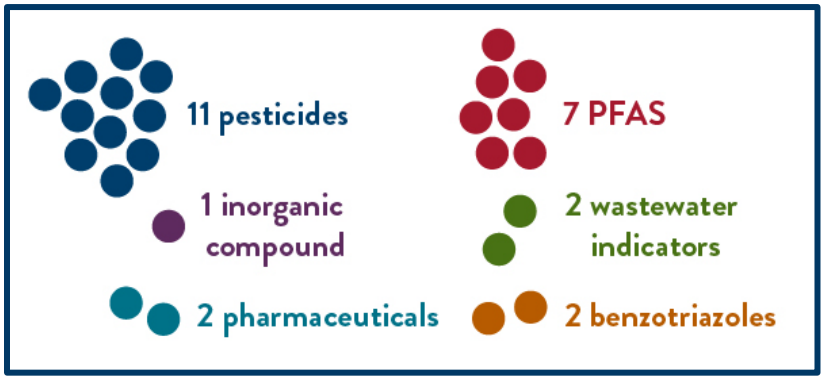
4. The ten most commonly detected CECs came from several classes of contaminants.

Across sampling results from all networks, the ten most frequently detected CECs included a wastewater indicator, a pharmaceutical, an inorganic compound, pesticides, PFAS, and a benzotriazole. Benzotriazoles are chemicals used in a wide variety of industrial, commercial, and consumer products.

Ten most frequently detected CECs



CECs detected in at least 20% of samples



5. Some CECs were detected more frequently in surface waters than in groundwater.

There were differences in CEC detections across the groundwater and surface water monitoring networks. More pharmaceuticals were detected than at the groundwater sites and at a higher relative frequency. Seven benzotriazoles and benzothiazoles were detected in surface water sites, compared to one across groundwater sites. Eleven PFAS were detected across surface water sites, but they were not as dominant in the sampling results compared to the groundwater sites.

6. CEC concentrations were generally higher in vulnerable settings compared to nonvulnerable settings

Samples collected in geologically vulnerable settings generally showed higher CEC concentrations than those collected from non-vulnerable sites.

7. Whether CECs were detected more frequently in the source water or finished water varied by CEC class.

Outside of lithium, which was detected in all samples, differences between source versus finished water sampling results varied by CEC class. For example, benzotriazoles and pharmaceuticals were more frequently detected in source samples, but tribromomethane, a wastewater indicator that is a common disinfection by-product, was more frequently detected in finished water. Occurrence and concentration of PFAS and pesticides were similar in source and finished samples.

Managing risks from CECs in drinking water

Through identifying frequently detected CECs and assessing their levels in drinking water sources, this project has enabled MDH to screen for potential health risks across this broad spectrum of CECs. MDH has used data from this project to:

- **Nominate and prioritize CECs for development health-based guidance.** Along with the Environmental Surveillance Assessment Section at MDH, the Drinking Water Protection Section has nominated CECs for development of health-based guidance values. These values help public water systems, consumers, and other stakeholders make informed decisions about managing health risks of CECs in drinking water.

- **Establish a Drinking Water Ambient Monitoring Program.** Through Clean Water Funds, MDH is creating for drinking water source surveillance at MDH, as well as for partners such as Minnesota Department of Agriculture or Minnesota Pollution Control Agency. Additional monitoring data can inform risk management for CECs with widespread occurrence and/or potential health effects.
- **Develop risk management approaches** for CECs. MDH has used this project to advance risk communication and potential risk management solutions with participating public water systems. MDH will use this information to identify and develop strategies for systems, local partners, and other stakeholders to address CECs. These may include regulatory actions, treatment or engineering solutions, or eliminating sources of contamination.

About the project sampling

MDH sampled CWSs that may be vulnerable to contamination based on their drinking water sources, land use, and geology. Participation in this project was voluntary. Funding for this project was provided by the Minnesota Environment and Natural Resources Trust Fund as recommended by the Legislative-Citizen Commission on Minnesota Resources (LCCMR).

MDH collected samples one time from CWSs with groundwater sources and two times from CWSs with surface water sources to account for changes in water quality across seasons. Samples were collected at the drinking water source and at the entry point ("finished water").

How were systems were selected for inclusion?

Three monitoring networks were established based on potential impacts from nearby land use to characterize occurrence and levels of CECs. The networks included **surface water systems** (17 CWSs), **agriculture-impacted systems** (30 CWSs), and **wastewater-impacted systems** (30 CWSs). Some systems were included in both the agriculture-impacted and wastewater-impacted networks. In 2021, 30 additional **non-vulnerable systems** with low geologic vulnerability were sampled, including 15 agriculture-impacted and 15 wastewater-impacted systems.

What CECs did MDH sample for?

MDH selected a set of over 600 parameters to sample for based on detection in previous studies and public health interest. Different parameters were analyzed at each of the networks.

	Pharmaceuticals	Benzotriazoles	Pesticides	Wastewater indicators	PFAS
Surface water network	✓	✓	✓	✓	✓
Agricultural network			✓		
Wastewater network	✓			✓	✓

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