



# Nominated Contaminants Status and Information

## MDH DRINKING WATER CONTAMINANTS OF EMERGING CONCERN (CEC) INITIATIVE

### Purpose of Document

This document summarizes information on contaminants that have been nominated to the CEC Initiative from 2009 to present and what actions MDH has taken. This is not a list of all contaminants of emerging concern, but only those that have been nominated to the CEC Initiative. It is not a complete list of all MDH review activity and guidance values derived by MDH. A complete listing of MDH health-based guidance values and support documents is available on the MDH [Human Health Based Water Guidance Table](https://www.health.state.mn.us/communities/environment/risk/guidance/gw/table.html) (<https://www.health.state.mn.us/communities/environment/risk/guidance/gw/table.html>).

### MDH Drinking Water Contaminants of Emerging Concern (CEC) Initiative

The Minnesota Department of Health (MDH) develops human health-based guidance for emerging contaminants in water to aid in planning, monitoring, and mitigating impacts from contaminants like pharmaceuticals, pesticides, personal care products, and industrial chemicals. MDH staff research where and how nominated contaminants are used in the state, their potential to enter Minnesota waters, and their toxicity to humans.

Minnesota risk managers, stakeholders, and members of the public may nominate contaminants to the Contaminants of Emerging Concern (CEC) Initiative. In addition, MDH staff identify additional candidate chemicals through our research and outreach with stakeholders. Nominations are accepted through the webpage [Nominate Contaminants](https://www.health.state.mn.us/communities/environment/risk/guidance/dwec/nominate.html) (<https://www.health.state.mn.us/communities/environment/risk/guidance/dwec/nominate.html>).



The initiative supports the Clean Water Fund (CWF) mission to *protect drinking water sources* and the MDH mission to protect, maintain, and improve the health of all Minnesotans.

## MDH Review Process

MDH staff first assess whether each nomination is eligible for review in the CEC program. If the nomination is eligible (meets the definition), MDH staff conduct a screening of where and how a contaminant is used in the state, its potential to enter the water supply, and its potential to harm humans. The results of the screening assessments help MDH prioritize and select contaminants for review with the intent of developing MDH health-based guidance.

Not all nominated and screened chemicals are selected for in-depth toxicological review. Chemicals identified as lower priority based on the screening assessments may remain in the pool for potential selection for review. For some contaminants, however, the available information is too limited to develop health-based guidance at this time. MDH is unlikely to select these chemicals for full toxicological review.

Upon selection for a full toxicological review, MDH staff carefully review exposure and toxicological information for the chemical to understand how humans may be exposed and what adverse health effects occur from exposure. Staff combine the results of in-depth analyses of toxicity and exposure to calculate MDH health-based guidance, a level of a contaminant in water that can be consumed with little to no harm to someone drinking the water.

Staff communicate completed health-based guidance to stakeholders on publicly available web pages, through an email subscription service (GovDelivery), and at a variety of meetings and events. Completed guidance may also be adopted into rule promulgated as MDH Health Risk Limits if eligible.

## MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION



### Abbreviations

- CASRN – Chemical Abstract Service Registration Number
- HRL – Health Risk Limit
- MDH – Minnesota Department of Health
- MDA – Minnesota Department of Agriculture
- MPCA – Minnesota Pollution Control Agency

**Table 1. Status of Nominated Contaminants in MDH CEC Initiative**

This table provides the status of each received nomination within the MDH CEC Initiative. Nominated contaminants are listed in alphabetical order according to the chemical’s status. **Bolded** names indicate that that status has changed from since the last document update (May 2022).

Status	Nominated Contaminants	
Full Toxicological Review Completed and guidance available	<ol style="list-style-type: none"> <li>1. Acetaminophen</li> <li>2. 6-Acetyl-1,1,2,4,4,7-hexamethyltetraline (Tonalide) (AHTN)</li> <li>3. Acrylamide</li> <li>4. Aminomethylphosphonic acid (AMPA)</li> <li>5. Anatoxin-a</li> <li><b>6. Benzophenone</b></li> <li><b>7. 1H-benzotriazole</b></li> <li><b>8. Biphenyl</b></li> <li>9. Bisphenol A (BPA)</li> <li>10. Butyl benzyl phthalate</li> <li>11. Carbamazepine</li> <li>12. Chlorpyrifos</li> <li>13. Chlorpyrifos oxon</li> <li>14. N,N-Diethyl-meta-toluamide (DEET)</li> <li>15. Desvenlafaxine</li> <li>16. Dibutyl phthalate (DBP)</li> <li>17. Dichlorofluoromethane</li> <li>18. (2,4-Dichlorophenoxy)acetic acid (2,4-D)</li> <li>19. Di(2-ethylhexyl)phthalate (DEHP)</li> <li>20. 1,4-Dioxane</li> <li><b>21. 17alpha-Ethinylestradiol</b></li> <li>22. Isobutanol</li> <li>23. Lead</li> <li>24. Mestranol</li> </ol>	<ol style="list-style-type: none"> <li>25. Methyl-1H-benzotriazole (tolyltriazole)</li> <li>26. 5-Methyl-1H-benzotriazole</li> <li>27. Metribuzin degradates (Metribuzin DA, DK, DADK)</li> <li>28. Microcystin-LR</li> <li>29. N-Nitrosodimethylamine (NDMA)</li> <li><b>30. Nonylphenol</b></li> <li><b>31. Octylphenol</b></li> <li><b>32. Perfluorobutane sulfonate (PFBS) (re-evaluation)</b></li> <li><b>33. Perfluorohexane sulfonate (PFHxS)</b></li> <li><b>34. Perfluorohexanoic acid (PFHxA)</b></li> <li><b>35. Perfluorooctanoic acid (PFOA) and salts</b></li> <li><b>36. Perfluorooctanoic sulfonate (PFOS) and salts</b></li> <li>37. Pyraclostrobin</li> <li>38. Strontium (stable)</li> <li>39. Sulfamethazine</li> <li>40. Sulfamethoxazole</li> <li>41. Tetrahydrofuran</li> <li>42. 1,2,3-Trichloropropane</li> <li>43. Triclocarban</li> <li>44. Triclosan</li> <li><b>45. Tris(2-butoxyethyl)phosphate (TBEP)</b></li> <li><b>46. Tris(2-chloroethyl)phosphate (TCEP)</b></li> <li><b>47. Tris(1,3-dichloroisopropyl)phosphate (TDCPP)</b></li> <li><b>48. Venlafaxine</b></li> </ol>
Contaminant Selected for Full Toxicological Review; Review in progress	<ol style="list-style-type: none"> <li><b>1. Tributyl Phosphate (TBP)</b></li> </ol>	
Toxicity and Exposure Screening Completed <i>[chemicals that were re-nominated and re-screened are noted in italics]</i>	<ol style="list-style-type: none"> <li>1. Acesulfame K</li> <li>2. Amitriptyline</li> <li>3. Androstenedione</li> <li>4. Androsterone</li> <li>5. Anthraquinone</li> <li>6. Azithromycin</li> </ol>	<ol style="list-style-type: none"> <li><b>61. Lidocaine</b></li> <li>62. Lincomycin</li> <li>63. Lithium bis(trifluoromethylsulfonyl)azanide</li> <li>64. Menthol (D/L Menthol)</li> <li>65. Meprobamate</li> <li><b>66. Metformin</b></li> </ol>

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Status	Nominated Contaminants	
Toxicity and Exposure Screening Completed <i>[chemicals that were re-nominated and re-screened are noted in italics]</i>	7. Bifenthrin	67. 2-Methoxyethanol
	8. Bisphenol S	68. Methyl paraben
	9. Bromoacetic acid (monobromoacetic acid)	69. N-Methylperfluorooctanesulfonamido acetic acid (N-MeFOSAA)
	10. Bromochloroacetic acid	70. Metoprolol
	11. Bromodichloroacetic acid	<b>71. Nanosilver</b>
	12. Bromoform	72. Naproxen
	13. 1-Bromopropane	73. Nicotine (3-[(2S)-1-,methylpyrrolidin-2-yl]pyridine)
	14. Bupropion	<b>74. Nodularin</b>
	15. Butylated hydroxyanisole	<b>75. 4-Nonylphenol diethoxycarboxylate (NP2EC)</b>
	16. Carbadox	<b>76. Nonylphenol diethoxylate (NP2EO)</b>
	17. Chlorate	<b>77. 4-Nonylphenol monoethoxycarboxylate (NP1EC)</b>
	18. Chlorinated paraffins (short, medium, and long chain)	<b>78. Nonylphenol monoethoxylate (NP1EO)</b>
	19. Chloroacetic acid (Monochloroacetic acid)	<b>79. 4-Nonylphenol triethoxycarboxylate (NP3EC)</b>
	<b>20. Chloroanil (2,3,5,6-Tetrachlorocyclohexa-2,5-diene-1,4-dione)</b>	80. Oxybenzone
	21. Cobalt	81. Oxyfluorfen
	22. Codeine	82. Perfluorodecanesulfonate (PFDS)
	23. Colchicine	83. Perfluorodecanoic acid (PFDA)
	24. Colloidal silver	84. Perfluorododecanoic acid (PFDoA)
	25. Copper sulfate	85. Perfluoroheptanoic acid (PFHpA)
	<b>26. Cotinine</b>	86. Perfluoroheptanesulfonic acid (PFHpS)
	27. Cylindrospermopsin	87. Perfluorohexanoic acid (PFHxA)
	28. Decabromodiphenyl ethane (DBDPE)	88. Perfluoro-3-methoxypropanoic acid (PFMPA)
	29. Decabromodiphenyl ether (decaBDE)	89. Perfluorononanoic acid (PFNA)
	30. Diallyl dimethyl ammonium chloride (DADMAC)	90. Perfluorooctanesulfonamide (PFOSA)
	31. Dibromoacetic acid	91. Perfluoropentanesulfonate/Perfluoropentanesulfonic acid (PFPeS)
	32. Dibromochloroacetic acid (Chlorodibromoacetic acid)	92. Perfluoropentanoic acid (PFPeA)
	33. Dichloroacetic acid	93. Perfluorotetradecanoic acid (PFTeA)
	34. Dichloriodomethane	94. Perfluorotridecanoic acid (PFTriA)
	35. Diethylene glycol	95. Perfluoroundecanoic acid (PFUnA)
	36. Dimethipin	96. Piperonyl butoxide
	<b>37. 5,6-Dimethyl benzotriazole</b>	97. Polydiallyl dimethyl ammonium chloride (pDADMAC)
	38. Diphenhydramine	98. 2-Propen-1-ol (allyl alcohol)
	39. Diquat	99. Propranolol
	40. Endothall (Aquathol)	100. Propyl paraben
	<b>41. Estrone</b>	101. Saflufenacil
	42. 17 beta-Estradiol	
	43. Ethoprop	

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Status	Nominated Contaminants	
Toxicity and Exposure Screening Completed <i>[chemicals that were re-nominated and re-screened are noted in italics]</i>	44. N-Ethylperfluorooctanesulfonamido acetic acid (N-EtFOSAA) 45. Fluconazole 46. 6:2 Fluorotelomer sulfonic acid (6:2 FtSA) 47. Fluoxetine 48. Fluridone 49. Formaldehyde 50. Gemfibrozil <b>51. Germanium</b> 52. Hexabromocyclododecane (HBCD) 53. Hexahydrohexamethyl-cyclopenta-benzopyran (HHCB) 54. Hydroquinone 55. Imazapyr 56. Imazethapyr 57. Iodoacetamide 58. Iodoacetic acid 59. Iodoform <b>60. Iopamidol</b>	102. Saxitoxin 103. Sertraline <b>104. Skatol (3-methyl-1H-indole)</b> 105. Sulfathiazole <b>106. o-Toluidine</b> 107. Tramadol 108. Triamterene 109. Tribromoacetic acid 110. Tributyl phosphate (TBP) 111. Triclopyr 112. Trichloroacetic acid <b>113. Trifluoroacetic acid and salts</b> 114. Trimethoprim 115. Triphenyl phosphate 116. Valsartan 117. Warfarin
Contaminant included in the HRL Program Workplan and/or guidance available	1. Cadmium 2. Dechlorometolachlor & Hydroxymetolachlor 3. 1,2-trans Dichloroethene (re-evaluation) 4. Glyphosate (AquaNeat)	5. 2-Hydroxyatrazine 6. Quinoline 7. Thiamethoxam <b>8. Lithium</b>
Does not meet MDH Definition of a CEC – No Further MDH action at this time	1. Arsenic 2. Fluoride 3. Fluorosilicic acid 4. Methyl tert-butyl ether (MTBE) 5. Mercury 6. Mining Related Compounds	7. Mixtures (of compounds) 8. PFAS chemicals (no specific chemical(s) identified) 9. Profenofos 10. Sulfate 11. Tribufos 12. Tritium

## Table 2. Nominated Contaminants Information from Nominator

This table contains identifying information for each received nomination, who nominated the contaminant and when, and the exposure and toxicity information for the contaminant provided by the nominator. Table 2 is organized with the contaminants in alphabetical order. **Bolded** names indicate that that status has changed from since the last document update.

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Acesulfame K [55589-62-3]	MPCA (March 2017)	Artificial sweetener	Acesulfame K is commonly detected in aqueous environmental samples and is reported to pass through wastewater treatment plants unchanged. MPCA survey results show that it is detected in numerous river samples and is present at concentrations of 5.816 µg/L.	The persistence of this CEC raises questions about its longevity in the environment, its ability to accumulate in natural waters, and its impact (directly or via photodegradation by-products) on organisms.
Acetaminophen [103-90-2]	MDH (June 2010)	Over-the-counter pharmaceutical.	Acetaminophen has been detected in Minnesota and national monitoring studies (b,c,e)	None provided.
6-Acetyl-1,1,2,4,4,7-hexamethyltetraline or Tonalide (AHTN) [21145-77-7 or 1506-02-1]	MDH (May 2010)	Fragrance	AHTN has been detected in Minnesota and national monitoring studies (a,c,e).	A suspected potential endocrine disruptor that has been detected in human breast milk and fat tissues.
Acrylamide [79-06-1]	MDH (March 2013)	Monomer residuals found in polymer homologues that are used as a flocculent in frac sand washing operations.	Rinse water containing flocculants and their monomer residues are returned to mines. Several mines are excavated below the water table and into drinking water aquifers. Acrylamide is very soluble, mobile, and under groundwater conditions may have very slow biodegradation rates.	Identified as a "likely carcinogen" by the U.S. Environmental Protection Agency (EPA).
Aminomethylphosphonic acid (AMPA) [1066-51-9]	MDA (July 2016)	Degradate of Glyphosate pesticide.	AMPA is a metabolite and an environmental degradate of Glyphosate.	None provided.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Amitriptyline [50-48-6]	MPCA (June 2015)	Anti-depressant and anti-anxiety drug used to treat depression and other disorders, such as attention deficit hyperactivity disorder and eating disorders.	Amitriptyline was found in 28% of the 50 randomly selected lakes monitored by the MPCA in its 2012 statewide probabilistic survey. In a more limited study conducted by the MPCA in 2013, it was found in 18% of the lakes studied. The maximum concentration of amitriptyline detected in the 2013 study was 0.503 ng/L. Amitriptyline was not detected in MPCA's ambient groundwater monitoring project through 2014.	None provided.
Anatoxin-a [64285-06-9]	MPCA (August 2015)	Cyanobacteria	Very little environmental data in Minnesota due to analytical and resource limitation. MPCA continues to review available analytical methods and explore monitoring options.	Both California and EPA have reviewed toxicological data to develop recreational and drinking water guidance values, respectively. California developed short-term recreational values. EPA concluded that toxicological data were insufficient to examine chronic toxicity and no drinking water guidance was provided. Review by MDH would help provide context.



MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Androstenedione [63-05-8]	MPCA (June 2015)	Androstenedione is a natural androgen steroid. Androstenedione is also produced synthetically for use as a supplement.	Androstenedione was found in 30% of the 50 randomly selected lakes monitored by the MPCA in its 2012 statewide probabilistic survey. In a more limited study conducted by the MPCA in 2013, androstenedione was found in 27% of the lakes monitored. The maximum concentrations detected were 7.5 ng/L in 2012 and 5 ng/L in 2013. Androstenedione has not been detected in groundwater monitored by the MPCA through 2014 as part of its ambient groundwater monitoring project.	None provided.
Androsterone [53-41-8]	MDH (January 2020)	Endogenous steroid hormone	Sampled in community water systems under EPA's Unregulated Contaminant Monitoring Rule (UCMR) program. Multiple detections in public drinking water systems.	None provided.
Anthraquinone [84-65-1]	MDH (February 2019)	Anthraquinone is used in dye manufacturing, as a goose repellent, and in the paper pulping process.	Anthraquinone was detected in finished drinking water in several Minnesota cities that use surface water as source water. It has also been detected in Minnesota groundwater and surface water at levels less than 1 µg/L.	Anthraquinone is potentially carcinogenic to humans. There are several secondary reviews and studies available.
Arsenic [7440-38-2]	Citizen (November 2011)	Naturally occurring metalloid element used in a variety of industrial products.	None provided.	None provided.  *MDH Note: The EPA regulatory standard for public drinking water systems (MCL) is 10 µg/L.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Azithromycin [83905-01-5]	MPCA (March 2017)	Antibiotic	Azithromycin has been measured in MN ambient groundwater since 2009. It was one of the more frequently detected CECs in groundwater samples, including domestic drinking water wells, collected between 2009 and 2012. Detected concentrations ranged from 0.005 to 0.023 µg/L.	Azithromycin is a widely used antibiotic.
Benzophenone [119-61-9]	MPCA (August 2013)	Ultraviolet inhibitor used in sunscreens and many other cosmetics and personal care products. It and other benzophenone derivatives are also widely used in plastics and other polymeric materials.	Benzophenone was detected in about 70% of the water samples collected in the USGS study of the lower St. Louis River (i).	None provided.
1H-Benzotriazole (BT) [95-14-7]	MPCA (August 2013)	Anticorrosive used in deicers, hydraulic fluids and antifreeze as well as in coatings and paint for furniture, floors, walks, doors and windows. It is also a UV light filter and stabilizer in a variety of plastic products.	BT has been identified in house dust, in municipal wastewater, river water and drinking water. It has been found to be present in 6% of surface water samples collected in a 2010 study of CECs in Minnesota rivers and streams. Maximum concentration found was 1.24 µg/L.	None provided.
Bifenthrin [82657-04-3]	MPCA (August 2015)	Insecticide/miticide in the pyrethroid family of chemicals, which are widely used in and around households (including indoor pet uses), in food handling establishments, to control mosquitoes, and in agriculture, including on livestock.	MPCA is currently assessing bifenthrin's potential impact on aquatic life. MDA monitors Minnesota's surface water and groundwater for these chemicals.	Bifenthrin is highly toxic to aquatic organisms, including fish. As such, it is listed as a restricted use pesticide. Bifenthrin is a possible human carcinogen and may be an endocrine disruptor.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Biphenyl [92-52-4]	MDH (September 2013)	Natural component of crude oil or coal tar. Used as a chemical synthesis intermediate, dye carrier, and component in heat transfer fluids.	None provided.	EPA has recently finalized a toxicological review. This review contains a revised reference dose and a new cancer slope factor.
Bisphenol A (BPA) [80-05-7]	Preventing Harm Minnesota (January 2011) MDH (February 2011) MPCA (April 2011)	Used in the manufacture of polycarbonate plastics and epoxy resins.	Bisphenol A has been found in serum, breast milk, urine, amniotic fluid, fetal blood, and umbilical cord blood as well as other human tissues and body fluids. Ninety-two percent of Americans have detectable levels of BPA in their bodies (f). BPA has been detected in Minnesota groundwater and surface waters.	NTP has stated that there is some concern for effects on the brain, behavior, and prostate gland in fetuses, infants and children at current human exposures to bisphenol A. BPA is a known endocrine active chemical.
Bisphenol S [80-09-1]	Citizen (April 2018)	Used in the manufacture of polycarbonate plastics. Replacement for BPA	None provided	Similarities in structure to BPA. May have similar concerns.
Bromoacetic acid (also known as Monobromoacetic acid) [79-08-3]	MDH (January 2017)	Disinfection by-products (DBPs) from drinking water treatment.	Included in the Brominated Haloacetic Acid (Br HAA) list 5, 6, and 9 of UCMR4. Data collected for contaminants suspected to be in drinking water but do not have health-based standards.	None provided.
Bromochloroacetic acid [5589-96-8]	MDH (January 2017)	Disinfection by-products (DBPs) from drinking water treatment.	Included in Br HAA list 6 and 9 of the UCMR4. UCMR4 collects data on contaminants that are suspected to be present in drinking water but do not have health-based standards. Monitoring of selected public water systems will begin January 2018.	None provided.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Bromodichloroacetic acid [71133-14-7]	MDH (January 2017)	Disinfection by-products (DBPs) from drinking water treatment.	Included in Br HAA list 6 and 9 of the UCMR4. UCMR4 collects data on contaminants that are suspected to be present in drinking water but do not have health-based standards. Monitoring of selected public water systems will begin January 2018.	None provided.
Bromoform [75-25-2]	MPCA (June 2015)	Bromoform is formed in water treatment when chlorine is added to drinking water to kill bacteria. It is one of several chemicals referred to as disinfection by-products (DBPs).	Bromoform is routinely analyzed in groundwater collected by the MPCA from the Ambient Groundwater Monitoring Network. Between 1999 and 2014, out of 686 samples analyzed, bromoform was detected in six samples. The maximum concentration detected was 2.1 µg/L. Bromoform was also detected at estimated concentrations ranging from 1.630 to 0.037 µg/L in water collected from WWTP outflows to rivers as part of a 2007 U.S. Geological Survey study of three streams and associated wastewater treatment plants.	The availability of new toxicity data for bromoform, as well as concern about its presence in drinking water and in our water resources, are the key considerations for this nomination.
1-Bromopropane [106-94-5]	MDH (January 2017)	Used in asphalt, aircraft, synthetic fiber manufacturing, immersion degreaser, and as a cleaning solvent. It can also be used as an adhesive in laminates and foam products as well as a chemical intermediate in pharmaceuticals, pesticides, quaternary ammonium compounds, flavors, and fragrances.	The use of 1-bromopropane has increased in recent years. Given its wide array of uses and its chemical properties the release to the environment is likely. EPA has recently added 1-Bromopropane to the Toxic Release Inventory (TRI) list of reportable chemicals.	The National Toxicology Program (NTP) has recently identified 1-bromopropane as "reasonably anticipated to be a human carcinogen."

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Bupropion [34911-55-2]	Citizen (July 2011)	Pharmaceutical - antidepressant.	This antidepressant medication has been detected in Minnesota waterways (g) which is concerning for the health of the general public. Although there is evidence of this pharmaceutical in the water, the significance has not been established due to insufficient knowledge and data.	None provided.
Butylated hydroxyanisole [25013-16-5]	MDH (January 2017)	Semivolatile compound, used as antioxidant and preservative in food, food packaging, animal feed, cosmetics, rubber and petroleum products. Also used in medicines.	UCMR4 analyte. Sampling of selected public water systems will begin in 2018.	None provided.
Butyl benzyl phthalate (BBP) [85-68-7]	MDH (February 2011)	Used in polyvinyl chloride (PVC), plastics, paints, cosmetics, wood varnish, and medical supplies.	Biomonitoring data show that metabolites of BBP are found in urine of the general population. BBP has also been found in human adipose tissue.	Studies in laboratory animals have shown that phthalates can cause developmental and reproductive effects, kidney and liver damage, as well as mortality.
Cadmium [7440-43-9]	MDH (February 2011)	Naturally occurring metal used in a variety of industrial processes.	Cadmium has some properties similar to lead and has been used as a substitute in some products.	Cadmium can accumulate in the body. Cadmium can cause kidney damage, malformation of bone, and there is limited evidence of neurotoxicity and endocrine disruption.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Carbadox [6804-07-5]	MPCA (June 2015)	Carbadox is a swine antibiotic that is used in the U.S. to treat swine dysentery and enteritis and as a food additive for promoting growth.	Carbadox was found in 28% of the 50 randomly selected lakes monitored by the MPCA in its 2012 statewide probabilistic survey. In the more limited study of 11 lakes in 2013, just under 10% of the lakes monitored were found to contain carbadox. The maximum concentrations detected were 121 ng/L in 2012 and 5.45 ng/L in 2013. To date, carbadox has not been analyzed in groundwater monitored as part of the MPCA's ambient groundwater monitoring project. Carbadox will be analyzed beginning with the MPCA's 2015 monitoring.	Due to reports of carcinogenicity and mutagenicity, carbadox's use in livestock has been banned in Canada, Australia, and the European Union.
Carbamazepine [298-46-4]	MDH (May 2010) Citizen (June 2011)	Pharmaceutical - anticonvulsant (Tegretol).	Detected in national USGS reconnaissance studies of untreated drinking water sources (a,c).	Known to have reproductive and developmental toxicity in humans at therapeutic doses. It also has caused adverse effects in the blood system and is considered a potential carcinogen.
Chlorate [14866-68-3]	MDH (January 2017)	Disinfection by-product from drinking water treatment.	UCMR3 analyte. Detected in several public water systems.	Animal studies provide evidence that long term exposure to chlorate result in effects on the blood system and the thyroid.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
<p>Chlorinated paraffins (CP) (short, medium, and long chains) [SCCP 85535-84-8] [MCCP 85535-85-9] [LCCP 85535-86-0]</p>	<p>MPCA (June 2015)</p>	<p>The uses for CPs are numerous and widespread. CPs are used as plasticizers in PVC, wire, toys, and a variety of consumer products. They are used as flame retardants, water repellants, additives in metalworking fluid, lubricating oils for metalworking, food packaging adhesives, as a fatting and softening agent in the leather industry, and in fracking fluids.</p>	<p>CPS are high production volume chemicals. MPCA is assessing CPs' potential toxicity to aquatic life. MPCA is currently investigating concentrations of CPs in fish, surface water, groundwater, sediment, and wastewater effluent around the state.</p>	<p>None provided.</p>
<p>Chloroacetic acid (Monochloroacetic acid) [79-11-8]</p>	<p>MDH (January 2017)</p>	<p>Disinfection by-products from drinking water treatment.</p>	<p>Included in Br HAA list 5 and 9 of the UCMR4. UCMR4 collects data on contaminants that are suspected to be present in drinking water, but which do not have health-based standards. Monitoring of selected public water systems will begin January 2018.</p>	<p>None provided.</p>
<p>Chloroanil (2,3,5,6-Tetrachlorocyclohexa-2,5-diene-1,4-dione) [118-75-2]</p>	<p>MDH (February 2016)</p>	<p>Degradate of Pentachlorophenol (PCP), a wood-treating chemical</p>	<p>PCP was used at many sites in Minnesota. Chloroanil is a highly persistent and highly mobile degradate.</p>	<p>Various studies indicate hepatotoxicity, genotoxicity, immunomodulatory effects, and CNS effects. Some publications suggest that it is more toxic than PCP itself.</p>
<p>2-[(8-Chloro-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8-hexadecafluorooctyl)oxy]-1,1,2,2-tetrafluoroethanesulfonic acid (C10 Cl-PFESA; 11Cl-PF3OUdS) [763051-92-9]</p>	<p>MPCA (October 2021)</p>	<p>PFAS chemical</p>	<p>MPCA has detected a variety of PFAS in various media in <a href="#">Project 1007 Corridor</a>. MPCA has requested that MDH evaluate these contaminants.</p>	<p>None provided.</p>

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Chlorpyrifos [2921-88-2]	MDH and MDA (January 2013)	Organophosphorus Insecticide	In April 2012 MDA determined that chlorpyrifos was a surface water pesticide of concern under the state Pesticide Management Plan (h).	Available chlorpyrifos guidance was developed in 1995 and does not incorporate subsequent changes to MDH guidance methodology and may not utilize current toxicity information.
Chlorpyrifos oxon [5598-15-2]	MDH and MDA (January 2013)	Water treatment transformation product of chlorpyrifos	See chlorpyrifos	No MDH human health-based guidance.
Cobalt [7440-48-4]	MDH (February 2019) MDH (March 2020)	Naturally occurring transition metal	It is commonly detected in Minnesota water. Minnesota contains the largest cobalt reserves in the US and a recent permit was granted for a mine that is expected to produce large amounts of cobalt starting in 2020. As cobalt mining activity increases in Minnesota, so does the potential for human exposure.	Cobalt primarily affects the hematopoietic (blood) system through oral exposure. It may also affect the heart. It does not appear to be carcinogenic through the oral route of exposure.
Codeine [76-57-3]	MDH and MPCA (January 2015)	Pharmaceutical - pain relief	Has been reported in wastewater (l), surface water (p) (including MN surface water (g)) and groundwater (q).	Has caused adverse effects on the respiratory system in humans. Has shown potential for developmental effects in laboratory animal studies. Identified as a potential concern based on preliminary work by MDH regarding water concentration values of health concern.
Colchicine [64-86-8]	MDH (January 2020)	Pharmaceutical – treatment of gout	Sampled in community water systems under UCMR program. Multiple detections in public drinking water system.	None provided.
Colloidal silver [9015-51-4]	Clean Water Action (January 2012)	Metal suspending in liquid	Increased use (medical applications and consumer products) and increased potential release to the environment.	Little understanding of the potential health effects as a drinking water contaminant.



MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Copper sulfate [7758-98-7, 7758-99-8, 1344-73-6, or 1332-14-5]	Citizen (November 2011)	Copper sulfate is used as an herbicide.	Copper sulfate is used as an aquatic herbicide in lakes.	Concerned about the long-term effects to both aquatic organisms, human health and groundwater.
Cotinine [486-56-6]	MPCA (January 2019)	Nicotine metabolite/alkaloid.	Cotinine was detected in 100% of 36 samples collected in a recent study. Cotinine is indicative of wastewater impacting stormwater. It has been detected in Minnesota groundwater (max 86 ng/L), stormwater (max 540 ng/L), and surface water (12.1 ng/L). (q, r)	None provided.
Cylindrospermopsin [143545-90-8]	MDH (January 2017)	Cyanotoxin	UCMR4 analyte. Sampling of public water systems will begin in January 2018. Cylindrospermopsin has been detected in Wisconsin lakes.	None provided.
Decabromodiphenyl ethane (DBDPE) [84852-53-9]	MPCA (June 2015)	DBDPE is an additive flame retardant used in a broad range of polymers, including consumer electronics, wire and cable coatings, and insulation foams. DBDPE production and use are increasing following a production ban on decabromodiphenyl ether (decaBDE).	MPCA is currently assessing DBDPE's potential impact on aquatic life. MPCA is not aware of environmental monitoring data from Minnesota for this chemical.	None provided.
Decabromodiphenyl ether (decaBDE) [1163-19-5]	MDH (February 2011)	Flame retardant used in a variety of products.	decaBDE is used in a variety of consumer products.	Based on laboratory animal studies, decaBDE can affect behavior as well as cause liver and other organ effects. decaBDE breaks down into congeners that are persistent, bioaccumulative and toxic.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Dechlorometolachlor [126605-22-9]	MDH (April 2021)	Pesticide	Chemical was chosen due to its presence in finished drinking water. It was detected through the Unregulated Contaminant Monitoring Project (UCMP) conducted by MDH in 2019. It was detected in 20% (12/59) of finished drinking water samples, with concentrations ranging from 1.57 to 20.7 ng/L. Detected in 6 public water system (PWS) well source water (detection frequency 20%, concentration range 1.62 - 12.4 ng/L). Detected in 17 PWS surface water intakes (detection frequency 50%, concentration range 2.39 - 42.1 ng/L)	None provided.
5,6-Dimethyl-1H-benzotriazole (5-6 XTZ) [4184-79-6]	MDH (April 2021)	Assumed to be similar to other benzotriazoles, e.g., anticorrosive used in deicers, dishwashing detergent, etc. as well as an UV light filter and stabilizer in a variety of plastic products.	Chemical was chosen due to its presence in finished drinking water. It was detected through the Unregulated Contaminant Monitoring Project (UCMP) conducted by MDH in 2019. It was detected in 16% (5/32) of finished drinking water samples, with concentrations ranging from 0.81 to 1.6 ng/L. Also detected in 6 public water system surface water intakes (detection frequency 18%, concentration range 0.78-9.6 ng/L). [Note: groundwater sampling was not conducted for this chemical as part of this study.]	None provided.
Desvenlafaxine [93413-62-8]	MDH (July 2014)	Pharmaceutical - active metabolite of Venlafaxine	None provided.	Could have similar effects to venlafaxine.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Diallyl dimethyl ammonium chloride (DADMAC) [7398-69-8]	MDH (March 2013)	Monomer residuals found in polymer homologues that are used as a flocculent in frac sand washing operations.	Rinse water containing flocculants and their monomer residues are returned to mines. Several mines are excavated below the water table and into drinking water aquifers. Very soluble, mobile, and unlikely to degrade under anaerobic conditions.	Can lead to NDMA formation. NDMA has been identified as a "reasonably anticipated human carcinogen" by EPA and is listed on EPA's UCMRL2 and CCL3.
Dibromoacetic acid [631-64-1]	MDH (January 2017)	Disinfection by-products from drinking water treatment.	Included in Br HAA list 5, 6, and 9 of the UCMR4. UCMR4 collects data on contaminants that are suspected to be present in drinking water, but which do not have health-based standards. Monitoring of selected public water systems will begin in January 2018.	None provided.
Dibromochloroacetic acid (Chlorodibromoacetic acid) [5278-95-5]	MDH (January 2017)	Disinfection by-products from drinking water treatment.	Included in Br HAA list 6 and 9 of the UCMR4. UCMR4 collects data on contaminants that are suspected to be present in drinking water, but do not have health-based standards. Monitoring of selected public water systems will begin in January 2018.	None provided.
Dibutyl phthalate (DBP) [84-74-2]	MDH (February 2011)	Used in polyvinyl chloride (PVC), plastics, paints, cosmetics, wood varnish, and medical supplies.	DBP has been found in human adipose tissue, blood, breast milk, and urine.	Studies in laboratory animals have shown that phthalates can cause developmental and reproductive effects, kidney and liver damage, as well as mortality.
Dichloroacetic acid [79-43-6]	MDH (January 2017)	Disinfection by-products from drinking water treatment.	Included in Br HAA list 6 and 9 of the UCMR4. UCMR4 collects data on contaminants that are suspected to be present in drinking water, but do not have health-based standards. Monitoring of selected public water systems will begin in January 2018.	None provided.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
1,2-trans Dichloroethene (1,2-trans Dichloroethylene) [156-60-5]	Consultant (January 2020)	TCE degradation product	Commonly found at PCE/TCE contaminated sites.	None provided.
Dichlorofluoromethane [75-43-4]	MPCA (January 2015) HRA (February 2015)	Used in refrigerants and propellants.	Dichlorofluoromethane has been found in groundwater, including residential wells, near closed landfills.	No available chemical-specific toxicity information available.
Dichloriodomethane [594-04-7]	MPCA (March 2017)	Disinfection by-product.	Formed when iodide is oxidized during chloramination of water. MPCA has submitted surface water samples for evaluation of iodo-DBPs and are awaiting results.	Some iodo-disinfection by-products (e.g., iodoacetic acid) have been found to be cytotoxic and genotoxic.
(2,4-Dichlorophenoxy) acetic acid (2,4-D) [94-75-7]  and 2,4-D choline [1048373-72-3]	Citizen (October 2011)  MDH and MDA (November 2014)	2, 4-D in the acid form as well as numerous salts and esters of 2, 4-D are presently registered as active pesticide ingredients. A new pesticide, Enlist Duo, is a mixture of 2, 4-D choline and glyphosate and may be registered for use in MN.	2, 4-D is used as an aquatic herbicide in lakes and is being registered in the US as a significant new use pesticide (with glyphosate) for crops resistant to the pesticides. Use of the new pesticide has the potential to increase the use of 2, 4-D choline.	Concerns about the long-term effects to both aquatic organisms, human health and groundwater. The current MDH HRL for 2, 4-D was promulgated in 1993. Since 1993, MDH's methodology has changed and more recent toxicology data are available.
Diethylene glycol [111-46-6]	Citizen (April 2018)	Used in antifreeze, cosmetics, lubricants, brake fluids, strippers and as a plasticizer	Released into the environment via production and use. Degrades quickly in water and soil.	Involved in mass poisonings. Can cause acute renal failure. Limited research on health impacts and toxicity.
Di(2-ethylhexyl)phthalate (DEHP) [117-81-7]	MDH (February 2011)	Used in polyvinyl chloride (PVC), plastics, paints, cosmetics, wood varnish, and medical supplies.	DEHP has been found in human adipose tissue, serum, breast milk, cord blood, and urine.	Studies in laboratory animals have shown that phthalates can cause developmental and reproductive effects, kidney and liver damage, as well as mortality.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
N,N-Diethyl-meta-toluamide (DEET) [134-62-3]	MDH (May 2010)  Citizen (June 2011)	Mosquito/insect repellent.	Has been detected in Minnesota and national monitoring studies (a,b,c,e).	A limited number of case reports of toxicity have been reported in humans. High doses have been reported to cause neurological effects in laboratory animals.
Dimethipin [55290-64-7]	MDH (January 2017)	Pesticide	UCMR4 analyte. Sampling of selected public water systems will begin in January 2018.	None provided.
N-(1,3-Dimethylbutyl)-N'-phenyl-1,4-benzenediamine (6PPD) [793-24-8]	Citizen (June 2021)	Antioxidant, antiozonant, and polymer stabilizer used in rubber production	6PPD is released from vehicle tires and gets converted by ozone to a quinone analog - 6PPD-quinone. 6PPD-Quinone has been shown to be the toxic chemical in stormwater runoff responsible for killing coho salmon before they spawn. Other areas where tire materials are used include playgrounds and artificial turf.	None provided.
1,4-Dioxane [123-91-1]	MDH (June 2010)  Citizen (April 2018)	Solvent additive; manufacturing by-product in personal care products.	None provided.	An EPA toxicological review was finalized and released in August 2010. The new analysis found cancer to be much more likely than previously thought.
4,8-Dioxa-3H-perfluorononanoic acid (ADONA) [919005-14-4]	MPCA (October 2021)	PFAS chemical	MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.	None provided.
Diphenhydramine [58-73-1]	MDH and MPCA (January 2015)  MPCA (March 2017)	Pharmaceutical - antihistamine and sleep aid	Has been reported in wastewater (l), surface water (l), and was one of the top six most frequently detected CECs in recent MN Ambient GW study (o). USGS has also identified it as a Tier 1 chemical (n).	Has caused adverse effects in the kidney and nervous system. May have developmental effects based on laboratory animal studies. Given how frequently found it is important to provide risk context.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Diquat [2764-72-9] <i>Diquat dibromide</i> [85-00-7]	Citizen (October 2011)	Diquat bromide is a non-selective contact algaecide, defoliant, desiccant and herbicide.	Diquat is used as an aquatic herbicide in lakes.	Concerned about the long-term effects to aquatic organisms, human health, and groundwater.
Endothall [acid: 145-73-3; dipotassium salt: 2164-07-0; N,N-dimethylalkylamine salt: 66330-88-9]  (Also separately nominated as Aquathol)	Citizen (October 2011)  Citizen (November 2011)	Endothall is used as an aquatic herbicide, a desiccant and a biocide. It is applied as either the dipotassium salt or the N,N-dimethylalkylamine salt.	Endothall is used as an aquatic herbicide in lakes. Aquathol is used to eliminate aquatic weeds.	There are concerns about the long-term effects to both aquatic organisms, human health, and groundwater.
Estrone [53-16-7]	Citizen (June 2011)	Hormone	Studies by the MPCA show the presence of estrone in Minnesota's waterways upstream, downstream, in sediment and in the effluent from wastewater treatment plants.	Steroid hormones in our waterways can affect the endocrine systems of humans and wildlife, even at extremely low levels.
17 beta-Estradiol [50-28-2]	MDH (March 2016)	Hormone	Has been detected in 12% of surface water samples collected upstream of wastewater treatment plants, in 68% of wastewater effluent samples, and in 50% of surface water samples downstream of wastewater treatment plants (g). A compilation of multiple USGS studies shows detections in 10% of surface water samples in Minnesota.	Considered biologically equivalent to estrone because 17beta-estradiol and estrone undergo reversible interconversion in the liver.
17 alpha-Ethinylestradiol [57-63-6]	MPCA (April 2011)	Synthetic hormone (oral contraceptive).	It has been detected in 13% of surface water samples collected as part of MPCA's Wastewater Treatment Plant study (g).	The widespread presence of estrogens (natural and synthetic) and estrogenic compounds in surface water and the numerous studies documenting feminization of fish are cause for concern.
Ethoprop [13194-48-4]	MDH (January 2017)	Pesticide	UCMR4 analyte. Sampling of selected public water systems will begin in Jan 2018.	None provided.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
N-ethyl-N-(2-hydroxyethyl)perfluorooctanesulfonamide (N-EtFOSE) [1691-99-2]	MPCA (October 2021)	PFAS chemical	MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.	None provided.
N-Ethyl perfluorooctanesulfonamide (N-EtFOSA) [4151-50-2]	MPCA (October 2021)	PFAS chemical	MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.	None provided.
N-Ethyl perfluorooctane-sulfonamido-acetic acid (N-EtFOSAA) [2991-50-6]	MPCA (April 2021)  MPCA (October 2021)	PFAS chemical	Nominated based on detection in surface and groundwater samples collected at the Project 1007 area (14.28% of groundwater samples, max concentration 0.88 ng/L; 19.21% of surface samples, max concentration 478 ng/L), located in the East Metro.  MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.	None provided.
Fluconazole [86386-73-4]	MPCA (March 2017)	Antifungal agent used to treat fungal infections in people.	MPCA has analyzed surface water and groundwater for fluconazole. It has been detected in ambient groundwater at concentrations up to 0.053 µg/L. In groundwater near wastewater land application sites, it has been detected at concentrations up to 0.124 µg/L.	None provided.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Fluoride [16984-48-8]	Citizen (April 2012)	Naturally occurring element.	It is mandated to be added to water but there is no adjustment for individual doses.  <i>*MDH Note: Minnesota requires fluoridation of water in all municipal water supplies except where natural levels are sufficient. Water systems and MDH monitor levels in drinking water to maintain safe, recommend levels of fluoride.*</i>	Nominator wrote: "May be a benefit to topical application but does no good and may harm by weakening teeth and bones, reducing IQ and causing many diseases."  <i>*MDH Note: Fluoridation of water is a safe, efficient, and equitable way to prevent dental disease and tooth decay.*</i>
Fluoxetine [54910-89-3]	MPCA (April 2011) MDH (January 2020)	Selective serotonin reuptake inhibitor (SSRI) antidepressant (e.g., Prozac).	Fluoxetine has been detected in Minnesota surface waters and was sampled in community water systems under UCMR program. Multiple detections in public drinking water systems.	Low threshold (parts per trillion concentration) for bioactivity in fish (i.e., slowed stress response, predator avoidance behavior) raises concerns.
Fluorosilicic acid [16961-83-4]	Citizen (April 2012)	Used as fluoridation agent for drinking water.	It is mandated to be added to water but there is no adjustment for individual doses.  <i>*MDH Note: Minnesota requires fluoridation of water in all municipal water supplies except where natural levels are sufficient. Water systems and MDH monitor levels in drinking water to maintain safe, recommend levels of fluoride.*</i>	May be a benefit to topical application but does no good and may harm by weakening teeth and bones, reducing IQ and causing many diseases.  <i>*MDH Note: Fluoridation of water is a safe, efficient, and equitable way to prevent dental disease and tooth decay.*</i>
4:2 Fluorotelomer sulfonic acid (4:2 FTS) [757124-72-4]	MPCA (October 2021)	PFAS chemical	MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.	None provided.



MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
6:2 Fluorotelomer sulfonic acid (6:2 FTS) [425670-75-3; 27619-97-2]	MDH (January 2020) MPCA (March 2020) MPCA (October 2021)	PFAS chemical	Sampled in community water systems under UCMR program. Multiple detections in public drinking water systems. Detected in 7.3% of ambient groundwater samples.  MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.	Similar health concerns to other PFAS.
8:2 Fluorotelomer sulfonic acid (8:2 FTS) [39108-34-4]	MPCA (October 2021)	PFAS chemical	MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.	None provided.
10:2 Fluorotelomer sulfonic acid (10:2 FTS) [120226-60-0]	MPCA (October 2021)	PFAS chemical	MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.	None provided.
Fluridone [59756-60-4]	Citizen (November 2011)	Fluridone is used as an aquatic herbicide.	Fluridone is used as an aquatic herbicide in lakes.	Concerned about the long-term effects to both aquatic organisms, human health and groundwater.
Formaldehyde [50-00-0]	MDH (February 2011) MPCA (July 2012)	Used in a wide variety of applications. It can be used as a solvent, a fixative, and to make binders and adhesives.	Formaldehyde volatilizes easily and is common in air. Has been detected in Minnesota surface and ground water.	Formaldehyde can irritate the respiratory tract, eyes, skin and gastrointestinal tract. Formaldehyde has been classified as carcinogenic to humans by inhalation.
Gemfibrozil [25812-30-0]	MPCA (March 2017)	Pharmaceutical used to regulate lipids.	Widely detected in MN rivers and lakes as well as ambient groundwater. Maximum detected in MN river water, lakes, and ambient groundwater to date: 0.1312 µg/L, 0.0132 µg/L, and 0.00209 µg/L.	Designed to be biologically active and used to lower lipid levels in people.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Germanium [7440-56-4]	MDH (January 2017)	Naturally occurring element. Used in fiber-optics, infrared optics, electric & solar electric applications and as polymerization catalysts.	UCMR4 analyte. Sampling of selected public water systems will begin in January 2018.	None provided.
Glyphosate [1071-83-6] (also separately nominated as AquaNeat)	Citizen (October 2011) MDA (June 2016)	Glyphosate is a non-selective herbicide and is the active ingredient in AquaNeat and several other pesticide formulations.	AquaNeat is routinely used to treat invasive species near surface waters.	Since it is routinely used there is concern about the adverse effects to groundwater, human health (drinking water) and aquatic organisms.
Hexabromocyclododecane (HBCD) [3194-55-6]	MDH (February 2011)	Flame retardant used in expanded polystyrene foam and extruded foam as well in furniture textiles.	HBCD is persistent and bioaccumulative.	HBCD has been shown to affect the thyroid in laboratory animals.
Hexahydrohexamethyl-cyclopentabenzopyran (HHCB) [1222-05-5]	MPCA (August 2013)	Synthetic fragrance.	One of the most commonly detected endocrine active chemicals (~25%) in water samples collected as part of the lower St. Louis River study conducted by USGS (i). It was also detected in more than 60% of the water samples collected downstream of Minnesota wastewater treatment plants as part of a study conducted by MPCA in 2001, with a maximum concentration of 640 µg/L.	None provided.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Hydroquinone [123-31-9]	Citizen (March 2018) The Beautywell Project (June 2019)	Hydroquinone, also called benzene-1,4-diol or quinol, is used as a developing agent in films, an intermediate in the production of rubber and food antioxidants, as a stabilizing agent, and is added to industrial monomers to inhibit polymerization during shipping, storage, and processing. The compounds is also an active ingredient in skin bleaching creams.	Common ingredient in skin bleaching and lightening creams, both prescription and OTC. Exposure can occur from occupational exposures as well.	From dermal and inhalation exposure, can cause acute effects such as dizziness and nausea . Oral exposure can lead to convulsions, tremors and death among other effects. Can enhance carcinogenic risk by prompting DNA damage and immune responses. Not currently classified as a carcinogen by EPA.
2-Hydroxyatrazine [2163-68-0]	MDH (April 2021)	Pesticide degradate	Chemical was chosen due to its presence in finished drinking water. It was detected through the Unregulated Contaminant Monitoring Project (UCMP) conducted by MDH in 2019. It was detected in 32% (19/59) of finished drinking water samples. Concentrations ranged from 5.81 to 86.3 ng/L. Also detected in 7 public water system well source water (detection frequency 23%, concentration range 7.08-120 ng/L). Detected at 15 public water system surface water intakes (detection frequency 44%, concentration range 9.92 - 176 ng/L)	None provided.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Hydroxymetolachlor [131068-72-9]	MDH (April 2021)	Pesticide degradate	Chemical was chosen due to its presence in finished drinking water. It was detected through the Unregulated Contaminant Monitoring Project (UCMP) conducted by MDH in 2019. It was detected in 10% (6/59) of finished drinking water samples, with concentrations ranged from 1.95 to 7.82 ng/L. No detections in public water system well source water. Detected in 15 public well system surface water intakes (detection frequency 44%, concentration range 2.66-50.4 ng/L).	None provided.
Imazapyr [81334-34-1]	Citizen (November 2011)	Imazapyr is used as an herbicide that is used to eliminate aquatic weeds.	Imazapyr is used as an aquatic herbicide in lakes.	Concerned about the long-term effects to both aquatic organisms, human health and groundwater.
Imazethapyr [81335-77-5]	MDH (April 2021)	Pesticide	Chemical was chosen due to its presence in finished drinking water. It was detected through the Unregulated Contaminant Monitoring Project (UCMP) conducted by MDH in 2019. It was detected in 22% (13/59) of finished drinking water samples, with concentrations ranged from 2.23 to 31.2 ng/L. Detected in 3 public water system well source water (detection frequency 10%, concentration range 7.96-38.1 ng/L). Detected in 7 public water system surface water intakes (detection frequency 21%, concentration range 8.09-25 ng/L).	None provided.
Iodoacetamide [144-48-9]	MPCA (March 2017)	Disinfection by-product (DBP).	Formed when iodide is oxidized during chloramination of water.	Some iodo-disinfection by-products (e.g., iodoacetic acid) have been found to be cytotoxic and genotoxic.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Iodoacetic acid [64-69-7]	MPCA (March 2017)	Disinfection by-product (DBP).	Formed when iodide is oxidized during chloramination of water.	Some iodo-disinfection by-products (e.g., iodoacetic acid) have been found to be cytotoxic and genotoxic.
Iodoform [75-47-8]	MPCA (March 2017)	Disinfection by-product (DBP).	Formed when iodide is oxidized during chloramination of water.	Some iodo-disinfection by-products (e.g., iodoacetic acid) have been found to be cytotoxic and genotoxic.
Iopamidol [60166-93-0]	MPCA (June 2015)	X-ray contrasting agent pharmaceutical	Found to be present in 73% of the 11 lakes sampled in 2013, with a maximum detected concentration of 510 ng/L. It was also found in 50% of the samples collected downstream of four wastewater treatment plants (WWTPs) monitored in this study at a maximum concentration of 510 ng/L, and at one upstream location at a concentration of 356 ng/L. To date, iopamidol has not been analyzed in groundwater monitored as part of the MPCA's ambient groundwater monitoring project. Iopamidol will be analyzed beginning with the MPCA's 2015 monitoring.	None provided.
Isobutanol [78-83-1]	MPCA (July 2013)	Industrial solvent and biofuel.	Ethanol plants in Minnesota may be converted to produce isobutanol. Production facilities may be located near drinking water supply management areas.	No MDH guidance value currently exists. Toxicological reviews from EPA (1987) and international Organization for Economic Cooperation and Development Screening Information Data Set (OECD SIDS) (2004) are available.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Lead [7439-92-1]	Citizen (November 2010) MDH (February 2011)	Naturally occurring metal-element used in a variety of industrial products.	People can be exposed to lead from contaminated soil, dust, paint, and drinking water.	Lead is a neurotoxin.
Lidocaine [137-58-6]	MPCA (March 2017)	Topical anesthetic	MPCA studies have analyzed for lidocaine in surface and groundwater. The maximum concentration found (0.0841 µg/L) was found in a monitoring well near a closed landfill. Lower levels have been detected in ambient groundwater, including a domestic well. Recently completed study evaluating groundwater near wastewater land application sites have reported concentrations up to 0.0769 µg/L. Lidocaine has also been detected in storm water at concentrations up to 0.0199 µg/L.	None provided.
Lincomycin [154-21-2]	MPCA (June 2015)	Antibiotic used for penicillin-allergic people. Also used in veterinary practice.	Lincomycin is the sixth most frequently detected CEC in groundwater analyzed between 2009 and 2012 from the MPCA's Ambient Groundwater Monitoring Network. It was detected in groundwater four times at a maximum concentration of 110 ng/L. To date, lincomycin has not been detected in surface water studies conducted by MPCA.	None provided.
Lithium [7439-93-2]	MDH (April 2017)	Naturally occurring element used as psychiatric medication as well as in batteries.	Recent publication of nationwide reconnaissance study of CECs in source and treated drinking water found lithium to be the most frequently quantified pharmaceutical with a maximum concentration of 46 µg/L (Furlong et al 2017).	Lithium has known biological activity and is used as an antipsychotic agent.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Lithium (bis)trifluoromethanesulfonimide (HQ-115) [90076-65-6]	MPCA (June 2021)	HQ-115 is used in organic electrolyte-based batteries as well as an intermediate and oxidizing/reducing agent.	Concentrations as high as 503,000 ng/L have been detected in effluent, 10,000 ng/L in outfall and ~2,500 ng/L in treated effluent.	Limited toxicity data. Short-term study indicates liver effects, which is a common endpoint across PFAS compounds.
Menthol (D/L Menthol) [89-78-1]	MPCA (January 2019)	Opioid Agonist and additive in tobacco products.	Detected in 67% of samples in recent study. Likely related to cigarette butts that are swept up in quantity by stormwater. It has been detected in Minnesota groundwater (max 40 ng/L), stormwater (max 1340 ng/L), and surface water. (q,r)	None provided.
Meprobamate [57-53-4]	MPCA (March 2017)	Psychotropic pharmaceutical used to treat anxiety.	Has been detected in MN surface water and groundwater. Results from samples of river water collected downstream from wastewater treatment plants found a maximum concentration of 0.0183 µg/L. Groundwater analysis near wastewater land application sites found concentrations up to 0.0576 µg/L and down gradient of closed landfills found concentrations up to 0.186 µg/L. Concentrations of 0.0277 µg/L have been found in a domestic well.	It has a propensity to cause physical and psychological dependence. It is no longer authorized for use in the European Union or in Canada but continues to be used in the United States.
Mercury, inorganic [7439-97-6]	Citizen (November 2010) The Beautywell Project (June 2019)	Naturally occurring metal-element used in a variety of industrial products.	Commonly found in skin lightening products among many other uses.	None provided
Mestranol [72-33-3]	MDH (November 2015)	Pharmaceutical - mestranol is the 3-methyl ether of 17α-ethinylestradiol.	None provided.	Related to 17a-ethinylestradiol.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Metformin [657-24-9] <i>Metformin hydrochloride</i> [1115-70-4]	MPCA (June 2015)	Metformin is a widely prescribed pharmaceutical for the treatment of type 2 diabetes.	MPCA's 2013 study reported detections of metformin in 36% of the 11 lakes sampled. It was also found at every upstream and downstream location of 4 wastewater treatment plants (WWTPs) that were sampled as part of this study. The maximum detected concentration in the lakes was 18 ng/L; the concentrations of metformin detected upstream and downstream of WWTPs ranged between 4.02 and 434 ng/L. MPCA will begin to analyze for metformin in groundwater as part of the MPCA's ambient groundwater monitoring project in 2015.	None provided.
2-Methoxyethanol [109-86-4]	MDH (January 2017)	Alcohol used as a solvent in varnishes, dyes, resins. Used in airplane deicing solutions.	Widely used in industrial solvents for resins, lacquers, dyes, and inks. UCMR4 analyte. Sampling of public water systems will begin in January 2018.	Blood system toxicant.
Methyl-1H-benzotriazole (Tolyltriazole) [29385-43-1]	MPCA (January 2019)	Corrosion inhibitor. Mixture of Benzotriazole isomers.	Methyl-1H-benzotriazole was detected in 100% of stormwater samples of recent study. Detected at higher frequency and lower concentrations than other methylated benzotriazoles. It has been detected in Minnesota groundwater (max 290 ng/L), stormwater (max 3890 ng/L), and surface water (max 14 ng/L). (q)	None provided.
5-Methyl-1H-benzotriazole [136-85-6]	MPCA (August 2013)	Corrosion inhibitor used in many of the same consumer and industrial products as 1H-benzotriazole. Commonly used in a technical mixture with 4-methyl-1H-benzotriazole that is called tolyltriazole (TT).	5-Methyl-1H-benzotriazole has been detected in one groundwater sample collected as part of the Minnesota ambient monitoring network. It was also detected in a water sample collected from one of the lakes sampled as part of MPCA's statewide monitoring study in 2007.	None provided.



MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Methyl paraben [99-76-3]	MPCA (June 2015)	Methyl paraben is an anti-fungal agent used in a variety of cosmetics and personal-care products. It is also used as a food preservative.	To date, methyl paraben has been monitored in only one MPCA study, a probabilistic survey of CECs at 150 randomly selected Minnesota stream locations. Methyl paraben was the most frequently detected CEC in that survey, detected at 32% of the sampled locations. The maximum concentration detected was 1 µg/L. Methyl paraben has not been analyzed in groundwater from the MPCA's Ambient Groundwater Monitoring Network.	None provided.
2-((4-Methylpentan-2-Y)amino)-5-(phenylamino)cyclohexa-2,5-diene-1,4-dione (6PPD-Quinone) [NA]	Citizen (June 2021)	Antioxidant, antiozonant, and polymer stabilizer used in rubber production	6PPD is released from vehicle tires and gets converted by ozone to a quinone analog - 6PPD-quinone. 6PPD-Quinone has been shown to be the toxic chemical in stormwater runoff responsible for killing coho salmon before they spawn. Other areas where tire materials are used include playgrounds and artificial turf.	None provided.
N-methyl-N-(2-hydroxyethyl)perfluorooctanesulfonamide (N-MeFOSE) [24448-09-7]	MPCA (October 2021)	PFAS chemical	MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.	None provided.
N-Methyl perfluorooctanesulfonamide (N-MeFOSA) [31506-32-8]	MPCA (October 2021)	PFAS chemical	MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.	None provided.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
N-Methyl perfluorooctane-sulfonamido-acetic acid (N-MeFOSAA) [2355-31-9]	MPCA (April 2021)  MPCA (October 2021)	PFAS chemical	Nominated based on detection in surface samples collected at the Project 1007 area (1.32% of samples, max concentration 2.33 ng/L), located in the East Metro. Also detected in the MPCA's Ambient Groundwater network (0.39% of samples, max concentration 2.08 ng/L).  MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.	None provided.
Methyl tertiary butyl ether (MTBE) [1634-04-4]	Clean Water Action (March 2012)  Citizen (April 2021)	Gasoline additive	There are increasing detections of MTBE in drinking water supplies in the US according to EPA. In addition, recent CDC NHANES biomonitoring results show that MTBE was detected in the blood of the majority of participants.	Studies have shown this chemical has carcinogenic effects.
Metoprolol [51384-51-1]	MDH (December 2014)  MPCA (April 2021)	Pharmaceutical - hypertension	Has been reported in wastewater effluent (j), surface water (k), and groundwater (l) as well as reported in finished drinking water (m). USGS has also identified it as a Tier 1 chemical (n).  Nominated based on detections in groundwater in the Ambient Groundwater monitoring studies (0.66% of samples, max concentration 295 ng/L) and in 24.2% of polar organic chemical integrative samplers (POCIS) in the Grand Portage Indian Reservation study (max concentration 13,100 ng/POCIS).	Has caused adverse effects in the nervous, blood, and cardiovascular systems in humans. Identified as a potential concern based on preliminary work by MDH regarding water concentration values of health concern.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Metribuzin degradates - Metribuzin DA [35045-02-4], Metribuzin DK [56507-37-0], Metribuzin DADK [52236-30-3]	MDH and MDA (April 2010)	Pesticide degradates	Degradates have been detected in shallow groundwater monitoring wells in agricultural areas of Minnesota (d)	Parent compound (metribuzin) has been shown to affect development, the nervous system and hormone levels.
Microcystin-LR [77238-39-2]	MPCA (April 2011)	A blue-green algal toxin.(Also referred to as cyanobacteria).	Has been detected in Minnesota surface waters in association with blue-green algal blooms.	Ingestion of blue-green algae has been associated with skin irritation, circulatory, nervous and digestive system effects as well as several deaths in dogs.
Mining related contaminants	Citizen (January 2011)	Mining related compounds	None provided	None provided.
Mixtures (of compounds)	Citizen (February 2012)	Mixtures of chemicals	Research on impacts from exposure to mixtures of compounds (particularly endocrine active compounds) has been conducted on fish.	None provided.
Nanosilver (Silver Nanoparticles) [not available]	Clean Water Action (January 2012)	Nanoparticles	Increased use (medical applications and consumer products) and increased potential release to the environment.	Little understanding of the potential health effects as a drinking water contaminant.
Naproxen [22204-53-1]	MPCA (April 2021)	Pharmaceutical Nonsteroidal anti-inflammatory drug (NSAID)	Nominated based on detections in groundwater in the Ambient Groundwater monitoring studies (0.92% of samples, max concentration 4740 ng/L) and in 39.4% of polar organic chemical integrative samplers (POCIS) in the Grand Portage Indian Reservation study (max concentration 60,100 ng/POCIS).	None provided.
Nicotine (3-[(2S)-1-methylpyrrolidin-2-yl]pyridine) [54-11-5]	MPCA (January 2019)	Tobacco alkaloid	Nicotine was detected in 94% of samples in a recent study. It has been detected in Minnesota groundwater (max of 40.2 ng/L), stormwater (max 3890 ng/L) and surface water. (q)	None provided.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
N-Nitrosodimethylamine (NDMA) [62-75-9]	MDH (March 2013)	Formed from pDADMAC and/or DADMAC in the presence of water disinfectants.	Rinse water containing flocculants and their monomer residues are returned to mines. Several mines are excavated below the water table and into drinking water aquifers.	None provided.
Nodularin [118399-22-7]	MDH (January 2017)	Cyanotoxin	UCMR4 analyte. Sampling of public water systems will begin in Jan 2018. However, it is typically associated with brackish water not freshwater.	None provided.
Nonylphenol [84852-15-3]	MPCA (April 2011)	Detergent/ surfactant (degradate of NP1EO and NP2EO).	Has been detected in 50% of Minnesota surface water samples in the MPCA 2010 wastewater treatment plant study (g).	Has been studied for its estrogenic activity.
Nonylphenol mono-ethoxylate (NP1EO) [27986-36-3]	MPCA (April 2011)	Detergent/surfactant	Has been detected in 40% of Minnesota surface water samples in the MPCA 2010 wastewater treatment plant study (g).	Frequently found with nonylphenol.
4-Nonylphenol monoethoxy-carboxylate (NP1EC) [3115-49-9]	MPCA (August 2013)	Microbial degradation products of alkylphenol-ethoxylates, which are used as detergents/surfactants.	Alkylphenoethoxy-carboxylates were frequently detected in the study of three Minnesota rivers conducted by USGS in 2007. NP1EC was found in over 40% of the samples collected from one of the rivers. The average concentration of nonylphenoethoxy-carboxylates was 33 µg/L.	None provided.
Nonylphenol di-ethoxylate (NP2EO) [20427-84-3]	MPCA (April 2011)	Detergent/ surfactant	Has been detected in 40% of Minnesota surface water samples in the MPCA 2010 wastewater treatment plant study (g).	Frequently found with nonylphenol.
4-Nonylphenol diethoxy-carboxylate (NP2EC) [106807-78-7]	MPCA (August 2013)	Microbial degradation products of alkylphenol-ethoxylates that are used as detergents & surfactants.	Alkylphenoethoxy-carboxylates were frequently detected in the study of three Minnesota rivers conducted by USGS in 2007. The average concentration of nonylphenoethoxy-carboxylates was 33 µg/L.	None provided.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
4-Nonylphenol triethoxy-carboxylate (NP3EC) [108149-59-3]	MPCA (August 2013)	Microbial degradation products of alkylphenol-ethoxylates that are used as detergents & surfactants.	Alkylphenoethoxy-carboxylates were frequently detected in the study of three Minnesota rivers conducted by USGS in 2007. The average concentration of nonylphenoethoxy-carboxylates was 33 µg/L.	None provided.
Octylphenol [140-66-9]	MPCA (April 2011)	Detergent/ surfactant	Has been detected in 10% of Minnesota surface water samples in the MPCA 2010 wastewater treatment plant study (g).	Has been studied for its estrogenic activity.
Oxybenzone [131-57-7]	MDH (March 2020)	Aromatic ketone. Naturally occurring as well as component of many sunscreen lotions.	CDC Biomonitoring has found this chemical in >95% of Americans.	Well-documented endocrine activity.
Oxyfluorfen [42874-03-3]	MDH (January 2017)	Pesticide	UCMR4 analyte. Sampling of public water systems will begin in January 2018.	None provided.
PFAS [no CAS provided]	Citizen (February 2020)	Large class of per- and polyfluorinated substances (PFAS)	Chemicals are contaminating drinking water.	Cancer rates are on the rise.
Perfluorobutane sulfonate (PFBS) [375-73-5]	MDH (July 2017) MPCA (October 2021)	PFAS chemical	Groundwater contaminant in the East Metro area. Has been detected in community drinking water wells. Soluble, mobile and persistent in the environment.  MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.	Re-evaluation discovered additional toxicity studies that have been published since MDH last reviewed the chemical (2009). Update warranted.
Perfluorobutanoate (PFBA) [375-22-4]	MPCA (October 2021)	PFAS chemical	MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.	None provided.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Perfluoro(2-((6-chlorohexyl)oxy)ethanesulfonic acid) (C8 Cl-PFESA; 9Cl-PF3ONS) [756426-58-1]	MPCA (October 2021)	PFAS chemical	MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.	None provided.
Perfluorodecanesulfonate (PFDS) [126105-34-8; 335-77-3]	MPCA (March 2020) MPCA (October 2021)	PFAS chemical	Detected in 0.4% of ambient groundwater samples. Has also been detected in surface water or foam.  MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.	None provided.
Perfluorodecanoic acid (PFDA) [335-76-2]	MPCA (March 2020) MDH (April 2021) MPCA (October 2021)	PFAS chemical	Detected in 0.9% of ambient groundwater samples. Has also been detected in surface water or foam.  Detected in Camp Ripley groundwater sampling at a maximum of 0.762 ng/L and at a frequency of 8% [based on 25 samples collected by Dept of Defense, 2017]  MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.	None provided.
Perfluorododecanesulfonic acid (PFDoS) [79780-39-5]	MPCA (October 2021)	PFAS chemical	MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.	None provided

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Perfluorododecanoic acid (PFDoA) [307-55-1]	<p>MDH (April 2021)</p> <p>MPCA (April 2021)</p> <p>MPCA (October 2021)</p>	PFAS chemical	<p>Detected in Camp Ripley groundwater sampling at a maximum of 1.06 ng/L and at a frequency of 8% [based on 25 samples collected by Dept of Defense, 2017]</p> <p>Nominated based on detection in surface and groundwater samples collected at Minnesota Closed Landfill sites (7.14% of surface water samples, max concentration 2.57 ng/L; 9.65% of groundwater samples, max concentration 49.6 ng/L).</p> <p>MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.</p>	None provided.
Perfluoroheptanoic acid (PFHpA) [375-85-9]	<p>MDH (January 2020)</p> <p>MPCA (March 2020)</p> <p>MDH (April 2021)</p> <p>MPCA (October 2021)</p>	PFAS chemical	<p>Sampled in community water systems under UCMR program. Multiple detections in public drinking water systems.</p> <p>Detected in 20.1% of ambient groundwater samples.</p> <p>In East Metro groundwater sampling it has been found at a maximum of 14 ng/L and at a frequency of 53% [based on 56 samples collected in Dec 2020-Feb 2021]</p> <p>MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.</p>	<p>Similar health concerns to other PFAS.</p> <p>See ITRC on-line documents.</p>

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Perfluoroheptanesulfonic acid (PFHpS) [375-92-8]	MPCA (April 2021) MPCA (October 2021)	PFAS chemical	<p>Nominated based on detection in surface and groundwater samples collected at the Project 1007 area (64.94% of surface water samples, max concentration 95.9 ng/L; 42.86% of groundwater samples, max concentration 8.12 ng/L), located in the East Metro. Also detected in the MPCA's Ambient Groundwater network (1.17% of samples, max concentration 30.7 ng/L).</p> <p>MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.</p>	None provided.
3-Perfluoroheptylpropanoic acid (7:3 FTCA) [812-70-4]	MPCA (October 2021)	PFAS chemical	MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.	None provided
Perfluorohexane sulfonate (PFHxS) [355-46-4]	MDH (May 2013) MPCA (October 2021)	PFAS chemical	<p>Groundwater contaminant in the East Metro area. Has been detected in community drinking water wells. Soluble, mobile and persistent in the environment.</p> <p>MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.</p>	Additional toxicity studies have been published since MDH last reviewed the chemical (2009). Studies suggest the chemical has a very long half-life and accumulates in humans.



MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Perfluorohexanoic acid (PFHxA) [307-24-4]	MDH (January 2020)  MPCA (March 2020)  MDH (April 2021)  MPCA (October 2021)	PFAS chemical	<p>Sampled in community water systems under UCMR program. Multiple detections in public drinking water systems.</p> <p>Detected in 33.8% of ambient groundwater samples.</p> <p>In East Metro groundwater sampling it has been found at a maximum of 400 ng/L and at a frequency of 40%.</p> <p>MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.</p>	Similar health concerns to other PFAS.
Perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA, Gen X) [13252-13-6]	MPCA (October 2021)	PFAS chemical	MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.	None provided.
Perfluoro(4-methoxybutanoic) acid (PFMOBA) [863090-89-5]	MPCA (October 2021)	PFAS chemical	MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.	None provided.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Perfluoro-3-methoxypropanoic acid (PFMPA) [377-73-1]	MDH (April 2021) MPCA (April 2021) MPCA (October 2021)	PFAS chemical	In East Metro groundwater sampling it has been found at a maximum of 4.2 ng/L and at a frequency of 5% [based on 56 samples collected in Dec 2020-Feb 2021]  Nominated based on detections in domestic water supply wells in the Twin Cities East Metro Area (5% of samples, max concentration 4.2 ng/L).  MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.	None provided.
Perfluorononanesulfonic acid (PFNS) [68259-12-1]	MPCA (October 2021)	PFAS chemical	MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.	None provided.
Perfluorononanoic acid (PFNA) [375-95-1]	MPCA (March 2020) MDH (April 2021) MPCA (October 2021)	PFAS chemical	Detected in 2.1% of ambient groundwater samples. Has also been detected in surface water or foam.  In East Metro groundwater sampling it has been found at a maximum of 4 ng/L and at a frequency of 12.5% [based on 56 samples collected in Dec 2020-Feb 2021].  MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.	None provided.  See ITRC on-line documents.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Perfluorooctanesulfonamide (PFOSA) [754-91-6]	MPCA (March 2020)  MPCA (October 2021)	PFAS chemical	Detected in 0.4% of ambient groundwater samples. Has also been detected in surface water or foam.  MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.	None provided.
2H,2H,3H,3H-Perfluorooctanoate (5:3 FTCA) [1799325-94-2]	MPCA (October 2021)	PFAS chemical	MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.	None provided.
Perfluorooctanoic Acid (PFOA) and Salts [335-67-1; 335-66-0; 3825-26-1; 2395-00-8; 335-93-3; 335-95-5]	MDH (May 2016)  MPCA (October 2021)	PFAS chemical	Groundwater contaminant in the East Metro area. Has been detected in community drinking water wells. Soluble, mobile and persistent in the environment.  MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.	EPA has recently finalized a toxicological review and final drinking water Health Advisory value.
Perfluorooctanoic Sulfonate (PFOS) and Salts [1763-23-1; 29081-56-9; 70225-14-8; 2795-39-3; 29457-72-5]	MDH (May 2016)  MPCA (October 2021)	PFAS chemical	Groundwater contaminant in the East Metro area. Has been detected in community drinking water wells. Soluble, mobile and persistent in the environment.  MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.	EPA has recently finalized a toxicological review and final drinking water Health Advisory value.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
<p>Perfluoropentanesulfonate (PFPeS_ion) [175905-36-9]                      Perfluoropentanesulfonic acid [2706-91-4]</p>	<p>MPCA (March 2020)                      MDH (April 2021)                      MPCA (October 2021)</p>	<p>PFAS chemical</p>	<p>Detected in 7.3% of ambient groundwater samples.                      In East Metro groundwater sampling it has been found at a maximum of 1.3 ng/L and at a frequency of 3.5% [based on 56 samples collected in Dec 2020-Feb 2021].                      MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.</p>	<p>None provided</p>
<p>Perfluoropentanoic acid (PFPeA) [2706-90-3]</p>	<p>MDH (January 2020)                      MPCA (March 2020)                      MDH (April 2021)</p>	<p>PFAS chemical</p>	<p>Sampled in community water systems under UCMR program. Multiple detections in public drinking water systems.                      Detected in 30.8% of ambient groundwater samples (as of 4/2020).                      In East Metro groundwater sampling, it has been found at a maximum of 300 ng/L and at a frequency of 70%.</p>	<p>Similar health concerns to other PFAS</p>
<p>Perfluorotetradecanoic acid (PFTeA) [376-06-7]</p>	<p>MDH (April 2021)                      MPCA (October 2021)</p>	<p>PFAS chemical</p>	<p>Detected in Camp Ripley groundwater sampling at a maximum of 3.07 ng/L and at a frequency of 36% [based on 25 samples collected by Dept of Defense, 2017].                      MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.</p>	<p>None provided.</p>

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Perfluorotridecanoic acid (PFTriA) [72629-94-8]	MDH (April 2021) MPCA (October 2021)	PFAS chemical	Detected in Camp Ripley groundwater sampling at a maximum of 1.4 ng/L and at a frequency of 12% [based on 25 samples collected by Dept of Defense, 2017].  MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.	None provided.
Perfluoroundecanoic acid (PFUnA) [2058-94-8]	MDH (April 2021) MPCA (April 2021) MPCA (October 2021)	PFAS chemical	Detected in Camp Ripley groundwater sampling at a maximum of 1.0 ng/L and at a frequency of 4% [based on 25 samples collected by Dept of Defense, 2017]  Nominated based on detection in surface and groundwater samples collected at Minnesota Closed Landfill sites (7.14% of surface water samples, max concentration 2.57 ng/L; 10.04% of groundwater samples, max concentration 29.8 ng/L) and in the Project 1007 area (0.65% of surface water samples, max concentration 0.847 ng/L) , located in the East Metro. Also detected in the MPCA's Ambient Groundwater network (0.39% of samples, max concentration 1.51 ng/L).  MPCA has detected a variety of PFAS in various media in Project 1007 Corridor. MPCA has requested that MDH evaluate these contaminants.	None provided.
Piperonyl butoxide [51-03-6]	MDH (February 2020)	Pesticide used in residential, commercial, and agricultural settings.	MDA considering adding to ambient monitoring program.	Recent developmental study highlights effects at much lower doses than previously thought.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Polydiallyl dimethyl ammonium chloride (pDADMAC) [26062-79-3]	MDH (March 2013)	Polymer used as a flocculant in frac sand washing operations.	Rinse water containing flocculants and their monomer residues are returned to mines. Several mines are excavated below the water table and into drinking water aquifers. Very soluble, mobile and unlikely to degrade under anaerobic conditions.	None provided.
Profenofos [41198-08-7]	MDH (January 2017)	Pesticide	UCMR4 analyte. Sampling of public water systems will begin in January 2018.	None provided.
2-Propen-1-ol (Allyl alcohol) [107-18-6]	MDH (January 2017)	Alcohol used in synthesis of glycerol, glycidyl ethers, esters, and amines.	UCMR4 analyte. Sampling of public water systems will begin in January 2018.	None provided.
Propranolol [525-66-6]	MPCA (April 2021)	Pharmaceutical (cardiovascular modulating agent)	Nominated based on detections in groundwater in the Ambient Groundwater monitoring studies (0.33% of samples, max concentration 56.1 ng/L) and in 18.2% of polar organic chemical integrative samplers (POCIS) in the Grand Portage Indian Reservation study (max concentration 5,990 ng/POCIS).	None provided.
Propyl paraben [94-13-3]	MDH (May 2010) MPCA (June 2015)	Propyl paraben occurs as a natural substance in many plants and some insects. Also manufactured synthetically for use as a preservative in cosmetics, pharmaceuticals and foods. It is a preservative typically found in many water-based cosmetics, such as creams, lotions, shampoos and bath products.	To date, propyl paraben has been monitored only in one MPCA study, the 2010 probabilistic survey of CECs at 150 randomly selected Minnesota stream locations. Propyl paraben was the second most frequently detected CEC in that survey, detected at 21% of the sampled locations. The maximum concentration detected was 600 ng/L. Propyl paraben has not been analyzed in groundwater from the MPCA's Ambient Groundwater Monitoring Network.	Food additive and used in personal care products. New information indicates possible male reproductive effects at lower dose levels than were previously considered 'safe'. Suspected of potential for endocrine disruption.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Pyraclostrobin [175013-18-0]	MDH and MDA (May 2010)	Fungicide	Fungicide now used as plant growth promoter. From 2003 to 2008 there was 3-fold increase in sales in Minnesota. Aerial application raises concern about surface water impacts.	At relatively high doses, has caused adverse effects in the digestive system, spleen/blood system, immune system and liver.
Quinoline [91-22-5]	MDH (January 2017)	Semivolatile compound extracted from coal tar and used in manufacture of dyes and as solvent for resins and terpenes.	UCMR4 analyte. Sampling of public water systems will begin in January 2018.	None provided.
Saflufenacil [372137-35-4]	MDA (July 2020)	Pesticide	Saflufenacil is showing increased frequency trends in Minnesota groundwater.	None provided.
Saxitoxin [35523-89-8]	MPCA (January 2019)	Algal toxin produced by cyanobacteria	It has been detected in Minnesota surface water. USGS has sampled for saxitoxins in Voyageurs National Park, with 22% of samples containing saxitoxin above a limit of detection (study underway). Sampling is also underway in southwestern Minnesota lakes.	Saxitoxins are highly toxic and are sometimes referred to as paralytic shellfish poisons. Its toxic mode of action is similar to that of anatoxin-a. Review of the saxitoxin information could also impact further updated review of anatoxin-a by MDH.
Sertraline [79617-96-2]	MPCA (April 2021)	Pharmaceutical (antidepressant)	Nominated based on detections in groundwater in the Ambient Groundwater monitoring studies (3.3% of samples, max concentration 23.3 ng/L), in surface water 30% of lakes in the 2017 National Lakes Assessment Survey (max concentration 2.66 ng/L) and in 18.2% of polar organic chemical integrative samplers (POCIS) in the Grand Portage Indian Reservation study (max concentration 4210 ng/POCIS).	None provided.
Skatol (3-Methyl-1H-Indole) [83-34-1]	MDH (August 2010)	Fragrance, food additive, stench in feces & coal tar.	Has been detected in Minnesota and national monitoring studies (c,e).	Very little toxicity information is available, but oral exposure has caused lung toxicity in animal studies.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Strontium (stable) [7440-24-6]	MDH (January 2017)	Naturally occurring element.	Analyte on UCMR3 monitoring list. Found in public water supplies.	Strontium has been found to decrease bone calcification, particularly in actively growing young animals. EPA has a Health Advisory of 1500 µg/L.
Sulfamethazine [57-68-1]	MDH (March 2013)	Antibiotic primarily used as a veterinary antibacterial drug in food animals.	None provided.	Similar chemical structure and toxicological profile as sulfamethoxazole.
Sulfamethoxazole [723-46-6]	MDH (July 2010) MPCA (July 2012)	Antibiotic – poultry, fish, etc.	Has been detected in Minnesota and national monitoring studies (a,b,c,e). Has been detected in Minnesota surface and ground water.	Possible effects on thyroid hormones have been reported in animals and humans. Thyroid tumors have been reported in animal studies.
Sulfate (as dissociated in water) [14808-79-8]	Citizen (April 2021)	Naturally occurring element	[shortened due to length] Sulfate plays an important role in its effect on mercury ability to methylate and bioaccumulate in babies, people, and biological creatures. MPCA continues to assert that knowledge about mercury methylation and the sulfate role is insufficient to include controls in permits. MPCA has put no controls on sulfate in the permits for PolyMet copper-nickel sulfide mining. We need MDH to provide the science about mercury and sulfate to the Governor, the Legislature, the MPCA, and the people in a way that makes it clear that sulfate must be regulated with respect to its role in mercury methylation. If this program is not the appropriate venue, please forward this request to the appropriate program.	None provided.



MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Sulfathiazole [72-14-0]	MPCA (March 2017)	Antibiotic	MPCA has detected sulfathiazole in lakes up to concentrations of 0.0328 µg/L. Ambient groundwater has also been analyzed for sulfathiazole. It was detected once, in a monitoring well, at a concentration of 0.17 µg/L.	None provided.
Tetrahydrofuran [109-99-9]	MPCA (July 2012) MPCA (August 2015)	Industrial solvent for PVC and varnishes.	Tetrahydrofuran is widely detected at relatively low concentrations in groundwater samples collected from Minnesota remediation sites. It has also been detected in groundwater by the MPCA Ambient Groundwater Monitoring project.	New EPA IRIS Toxicological Review document was posted Feb. 2012. Currently there is no HRL value for this chemical.
Thiamethoxam [153719-23-4]	Citizen (June 2012)	Pesticide	A common pesticide which decreases foraging success and survival in honeybees.	May contribute to colony collapse disorder in honeybees. Concerned about what direct health effects it may have on humans.
o-Toluidine [95-53-4]	MDH (January 2017)	Semivolatile compound used in dyes (hair coloring) and as precursor in manufacturing of pesticide metolachlor and acetochlor. A component in accelerators for cyanoacrylate glues. Clinical use: in reagent for glucose analysis and tissue staining.	UCMR4 analyte. Sampling of public water systems will begin in January 2018.	None provided.
Tramadol [27203-92-5]	MPCA (March 2017)	Opioid pain medication.	MN groundwater near wastewater land application sites have detected tramadol at concentrations up to 0.186 µg/L. It has also been detected in MN stormwater at a maximum concentration of 0.0136 µg/L. MN ambient groundwater has also been sampled but no detections were found.	None provided.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Triamterene [396-01-0]	MPCA (April 2021)	Pharmaceutical (cardiovascular modulating agent)	Nominated based on detections in groundwater in the Ambient GW monitoring studies (0.34% of samples, max concentration 0.346 ng/L), in surface water 4% of lakes in the 2017 National Lakes Assessment Survey (max concentration 21.1 ng/L) and in 27.3% of polar organic chemical integrative samplers (POCIS) in the Grand Portage Indian Reservation study (max concentration 4520 ng/POCIS).	None provided.
Tribromoacetic acid [75-96-7]	MDH (January 2017)	Disinfection by-products from drinking water treatment.	Included in the Br HAA list 6 and 9 for UCMR4. Sampling of public water systems will begin January 2018.	None provided.
Tribufos [78-48-8]	MDH (January 2017)	Pesticide	Included in the Br HAA list 6 and 9 for UCMR4. Sampling of public water systems will begin January 2018.	None provided.
Tributyl phosphate (TBP) [126-73-8]	MPCA (June 2015)	Solvent, anti-foaming agent and plasticizer	TBP was the fifth most frequently detected CEC in groundwater monitored by the MPCA from 2009 to 2012, being detected five times. The maximum detected concentration was 980 ng/L. TBP was also detected at estimated concentrations ranging from 82 to 21 ng/L in WWTP effluent as part of the 2007 U.S. Geological Survey study of three streams and associated WWTPs.	None provided.
Trichloroacetic acid [76-03-9]	MDH (January 2017)	Disinfection by-products from drinking water treatment.	Included in the Br HAA list 5 and 9 for UCMR4. Sampling of public water systems will begin January 2018.	None provided.
1,2,3-Trichloropropane [96-18-4]	MDH (April 2010)	Volatile organic compound (VOC) used as a solvent.	Rarely detected in Minnesota, however, detection methods may not be sensitive enough. Detected at low levels in groundwater and drinking water in other states.	Recent EPA review has significantly increased the toxicological concern based on carcinogenic potential.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Triclocarban [101-20-2]	MDH (August 2010)	Antimicrobial	None provided.	Potential for male reproductive effects based on animal studies. Also has caused adverse effects in the spleen, bone marrow, liver and kidney.
Triclopyr [55335-06-3]	Citizen (November 2011)	Triclopyr is used as a herbicide.	Triclopyr is used as an aquatic herbicide in lakes.	Concerned about the long-term effects to both aquatic organisms, human health and groundwater.
Triclosan [3380-34-5]	MDH (April 2010)	Antimicrobial, disinfectant.	Has been detected in Minnesota and national monitoring studies (a,b,c,e).	Studies in laboratory animals suggest that triclosan alters thyroid and female reproductive hormone levels.
Trifluoroacetic acid and salts [76-05-1]	MDH (March 2024)	Industrial chemical used as laboratory reagents and catalysts, environmental degradate of some PFAS and replacement refrigerants.	TFA can be formed from environmental oxidation of PFAA precursors, chlorofluorocarbons, and novel refrigerants, the photodegradation of thermolysis of fluoropolymers in the environment, and the biological degradation of plant-protecting agents or pharmaceuticals. A recent study from China has shown TFA to be the most abundant PFAS in outdoor/indoor dust. It cannot be removed with GAC or other scalable water treatments. TFA present in source water is likely present in finished drinking water. This may especially be a problem for water systems using surface water, as atmospheric degradation appears to be a major pathway for its environmental spread.	It has been detected in human blood, breast milk, and serum at comparable levels as PFOA and PFOS, despite having a shorter half-life, possibly due to serum protein binding and due to the high amount of TFA people are exposed to daily. At this time there is little known about potential human toxicity.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Trimethoprim [738-70-5]	MPCA (April 2011)	Antibiotic (used with sulfa antibiotics).	It is the second most commonly detected antibiotic in Minnesota surface water and effluent samples, being detected in 60% of such samples in the MPCA 2010 wastewater treatment plant study (g).	None provided.
Triphenyl phosphate [115-86-6]	MPCA (January 2019)	Flame retardant and plasticizer	It was detected in 36% of a recent stormwater study at a maximum of 60 ng/L. It has been detected in Minnesota rivers from a USGS study at a maximum of 13.6 ng/L. It has also been detected in Minnesota groundwater at a maximum concentration of 220 ng/L. It is thought to have increased in use after polybrominated diphenyl ethers (PBDEs) were phased out approximately 10 years ago. (q, r)	None provided.
Tris(2-butoxyethyl) phosphate (TBEP) [78-51-3]	MPCA (August 2013)	Plasticizer in rubber and plastics as well as an ingredient in floor polishes	TBEP is one of the most frequently detected CECs in Minnesota's ambient groundwater. It has been detected in about 9 percent of the wells sampled with a maximum concentration of 2 µg/L. TBEP was also detected in about 55% of the water samples collected as part of a study of the lower St. Louis River (i).	None provided.
Tris(2-chloroethyl) phosphate (TCEP) [115-96-8]	MDH (May 2010) MPCA (July 2012)	Plasticizer, flame retardant	Has been detected in Minnesota and national monitoring studies (a,b,c,e). Has been detected in Minnesota surface and ground water.	May cause neurotoxicity and brain lesions, reduced fertility, and cancer (kidney tumors).
Tris(1,3-dichloroisopropyl) phosphate (TDCPP) [13674-87-8]	MDH (December 2011) MPCA (July 2012)	Flame retardant	Has been detected in >10% of MN waters (USGS 2004) at 14.9% frequency (max 2.5 ppb) and is (or has been) on MPCA's GW Monitoring list. Has been detected in Minnesota surface and ground water.	Recently added to Calif. Prop. 65 carcinogen list.

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

Contaminant and [CASRN]	Nominator(s) and Date Nominated	Contaminant Use or Class	Exposure Information Summary Provided by Nominator	Toxicity Information Summary Provided by Nominator
Tritium [10028-17-8]	Citizen (May 2012)	Radioactive isotope of hydrogen	The Vermont Nuclear power plant is leaking tritium into their drinking water.  *MDH Note: MDH maintains a monitoring program for radioactivity around nuclear power plants in Minnesota. Current levels detected in Minnesota are below the EPA MCL. *	None provided.  *MDH Note: The US Environmental Protection Agency (EPA) regulatory standard for public drinking water systems (MCL) is 4 millirem/year.*
Valsartan [137862-53-4]	MPCA (April 2021)	Pharmaceutical (angiotensin receptor blocker (ARBs), treats high blood pressure & congestive heart failure)	Nominated based on detections in groundwater in the Ambient Groundwater monitoring studies (0.46% of samples, max concentration 1200 ng/L), in surface water 2% of lakes in the 2017 National Lakes Assessment Survey (max concentration 29.06 ng/L) and in 27.3% of polar organic chemical integrative samplers (POCIS) in the Grand Portage Indian Reservation study (max concentration 24,600 ng/POCIS).	None provided.
Venlafaxine [93413-69-5]	MPCA (April 2011) Citizen (June 2011) MDH (January 2020)	Serotonin-norepinephrine reuptake inhibitor (SNRI) antidepressant (e.g., Effexor)	Has been detected frequently in Minnesota surface waters downstream from wastewater treatment plants. Sampled in community water systems under UCMR program. Multiple detects in public drinking water systems.	Low threshold (parts per trillion concentration) for bioactivity in fish (i.e., slowed stress response, predator avoidance behavior) raises concerns.
Warfarin [81-81-2]	Citizen (April 2018)	Prescription medication used as a blood thinner; pesticide (rodenticide)	None provided.	None provided.

References Supplied by Nominators

MDH CEC INITIATIVE NOMINATED CONTAMINANT STATUS AND INFORMATION

- (a) American Water Works Association Research Foundation 2008. Toxicological Relevance of EDCs and Pharmaceuticals in Drinking Water. <https://www.waterrf.org/research/projects/toxicological-relevance-edcs-and-pharmaceuticals-drinking-water>
- (b) Barnes et al 2008 (A national reconnaissance by the USGS of pharmaceuticals and other organic wastewater contaminants in the United States - I) Groundwater. *Sci Total Env* 402:192-200)
- (c) Focazio et al 2008 (A national reconnaissance by the USGS for pharmaceuticals and other organic wastewater contaminants in the United States - II) Untreated drinking water sources. *Sci Total Env* 402:201-216
- (d) Minnesota Department of Agriculture (MDA) (2010). Groundwater pesticide data, 2000-2008. Personal communication from Brennon Schaefer, Hydrologist, MDA, Mar. 22, 2010.
- (e) USGS 2004. Presence and Distribution of Organic Wastewater Compounds in Wastewater, Surface, Ground, and Drinking Waters, Minnesota, 2000–02. Scientific Investigation Report 2004–5138. <http://pubs.usgs.gov/sir/2004/5138/>
- (f) Antonia M. Calafat, Xiaoyun Ye, Lee-Yang Wong, John A. Reidy, Larry L. Needham. 2007. Exposure of the U.S. population to bisphenol A and 4-tert-octylphenol: 2003-2004. *Environ. Health Perspectives* 116:39-44
- (g) MPCA 2011. Wastewater Treatment Plant Endocrine Disrupting Chemical Monitoring Study. <http://www.pca.state.mn.us/index.php/view-document.html?gid=15610>
- (h) Minnesota Department of Agriculture (MDA). Chlorpyrifos Information: <http://www.mda.state.mn.us/chlorpyrifos-information>
- (i) Christensen et al. 2012. Presence of selected chemicals of emerging concern in water and bottom sediment from the St. Louis River, St. Louis Bay and Superior Bay, Minnesota and Wisconsin, 2010: USGS Scientific Investigations Report 2012-5184.
- (j) Kostich, M., Batt, A., Lazorchak, J. 2014. Concentrations of prioritized pharmaceuticals in effluents from 50 large wastewater treatment plants in the US and implications for risk estimation. *Environmental Pollution*. 184: 354-359
- (k) Ternes, T. 2001. Pharmaceuticals and Metabolites as Contaminants in the Aquatic Environment: ACI - Pharmaceuticals and Care Products in the Environment: Daughton, C (ACS 2001)
- (l) Bradley, P.; Barber, L.; Duris, J.; Foreman, W.; Furlong, E.; Hubbard, L.; Hutchingson, K.; Keefe, S.; Kolpin, D. 2014. Riverbank filtration potential of pharmaceuticals in a waste-water impacted stream. *Environmental Pollution*. 193: 173-180
- (m) Van Der Hoeven, N., 2004. Current issues in statistics and models for ecotoxicological risk assessment. *Acta Biotheor.* 52 (3), 201–217. (as cited in Fent, K.; Weston, A., Caminada, D. *Ecotoxicology of human pharmaceuticals. Aquatic Toxicology* 76 (2006) 122-159. )
- (n) USGS 2012. Prioritization of Constituents for National- and Regional- Scale Ambient Monitoring of Water and Sediment in the US. Report 2012-5218
- (o) USGS 2014 Contaminants of Emerging Concern in Ambient Groundwater in Urbanized Areas of Minnesota 2009-12. Report 2014-5096
- (p) Kolpin, DW, Furlong, ET., Meyer, MT., Thurman, EM., Zaugg, SD., Barber, LB., Buxton, HT., 2002. Pharmaceuticals, hormones, and other organic wastewater contaminants in US streams, 1999-2000: a national reconnaissance. *Environ. Sci. Tech.* 36, 1202-1211
- (q) Fairbairn, D.J.; Elliott, S.M.; Kiesling, R. L.; Schoenfuss, H.L.; Ferrey, M.L.; and B.M. Westerhoff, 2018. Contaminants of emerging concern in urban stormwater: Spatiotemporal patterns and removal by iron-enhanced sand filters (IESFs). *Water Research*, 2018, 145, 332-345.
- (r) Bradley, P.M., Journey, C.A.; Romanok, K.M. Barber, L.B.; Buston, H.T.; Foreman, W.T.; Furlong, E.T.; Glassmeyer, S.T.; Hladik, M.L.; Iwanowicz, L.R.; Jones, D.K.; Kolpin, D.W.; Kuivila, K.M.; Loftin, K.A.; Mills, M.a.; Meyer, M.T.; Orlando, J.L.; Reilly, T.J.; Smalling, K.L. and D.L.Villeneuve, 2017. Expanded Target-Chemical Analysis Reveals Extensive Mixed-Organic-Contaminant Exposure in U.S. Streams, *Environ. Sci. Technol.*, 2017, 51(9), 4792-2802.

LAST UPDATED: AUGUST 2024

Minnesota Department of Health  
Health Risk Assessment  
625 Robert Street N  
PO Box 64975  
St. Paul, MN 55164-0975  
[health.risk@state.mn.us](mailto:health.risk@state.mn.us)  
[www.health.state.mn.us](http://www.health.state.mn.us)

10/4/2023

*To obtain this information in a different format, email: [health.risk@state.mn.us](mailto:health.risk@state.mn.us).*

