Drinking Water Contaminants of Emerging Concern Program

A Minnesota Clean Water Fund Initiative

Biennial Report: Fiscal Years 2012-2013

Minnesota Department of Health

July 2013

The Clean Water Fund: Protecting and restoring Minnesota's waters for generations to come.

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The CEC Program: Investigating and communicating the health and exposure potential of contaminants in drinking water.

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About the Program

The mission of the Drinking Water Contaminants of Emerging Concern (CEC) program is to investigate and communicate the health and exposure potential of contaminants of emerging concern in drinking water.

While there is no single description that defines contaminants of emerging or new concern, the Minnesota Department of Health (MDH) CEC program spends the majority of program resources on a specific group of CECs. These substances have been released to, found in, or have the potential to enter Minnesota waters (surface water and groundwater), and:

- pose a real or perceived human health threat,
- do not have Minnesota human health-based guidance (how much of a substance is safe to drink), or
- have new or changing health or exposure information.

MDH may also support work on water contaminants and drinking water issues of new or emerging concern that may not meet this definition. The list of contaminants of concern to scientists and the public continues to grow. Researchers are finding these contaminants in greater number in Minnesota waters, in part, because:

- there are better methods for finding substances at lower levels,
- additional substances are being looked for,
- new substances are being used, and
- old substances are being used in new ways.

Our ability to look for contaminants in the environment continues to expand, resulting in an increasing number and type of contaminants found. In addition, scientists are improving toxicological assessments to better identify health effects and sensitive subpopulations. These advances require new or additional approaches for understanding the sources of human exposure and potential health risk. In addition to deriving drinking water guidance values for contaminants of emerging concern, the CEC program is also involved in several special projects and research to address these needs.

The work of the CEC program helps MDH understand and communicate the potential health effects of these contaminants. Key goals of the program are to:

- collaborate with partners and the public to identify potential contaminants,
- investigate potential sources, impacts, exposures, and health risks of contaminants in drinking water,
- improve our ability to accurately characterize potential human health risks posed by contaminants in water,
- improve the risk assessment methods used to develop risk characterizations,
- determine how much of a contaminant in water is safe to drink, and
- inform partners and the public of appropriate options for action and decision-making.

Clean Water Fund Appropriations

MDH was allocated approximately $6 million from the Clean Water Fund (CWF) for the 2012-2013 biennium. Of this, MDH's Health Risk Assessment (HRA) unit received approximately $2 million for the biennium to address potential health risks related to contaminants of emerging concern, assessed through the unit's CEC program.

Supplementing Activities

CWF dollars must be used to supplement work in water quality. The dollars cannot be used to substitute funding for existing work. MDH, historically and currently, develops human health-based guidance for contaminants that have already been found in groundwater in Minnesota, largely as the result of point sources (e.g., hazardous waste sites), and provides advice to risk assessors and other interested parties through Health-Based Rules and Guidance for Groundwater[1]. MDH develops three types of health-based guidance:

- Health Based Values (HBVs) - guidance values based on substantial scientific information,
- Health Risk Limits (HRLs) - HBVs that have been made into rules for groundwater contaminants, and

[1] www.health.state.mn.us/divs/eh/risk/guidance/gw/index.html

- Risk Assessment Advice (RAA) - guidance values or other advice based on limited scientific information and or specialized risk assessment methods.

The work of developing health-based guidance for contaminants found in groundwater will continue. Funding for the CEC program expands these activities to address contaminants in both surface and groundwater, include contaminants from a wider range of sources (e.g. pharmaceuticals, consumer products), and evaluate use, occurrence, and potential for exposure.

Continuous Improvement

CEC program staff participated in a Kaizen (continuous improvement) event from August 22-25, 2011. The purpose of the Kaizen event was to evaluate potential opportunities to streamline the contaminant review and outreach processes by using continuous quality improvement techniques. Several process improvement changes were identified to reduce the complexity of reviews and internal approval steps. Staff also participated in a one-year follow up event in October of 2012. CEC staff continue to implement continuous improvement processes in all aspects of the CEC program.

Staffing

At the beginning of the biennium, staffing included a program manager, two toxicologists, and an exposure scientist. In order to meet the goals of the program, in 2013 MDH hired an additional Ph.D. level toxicologist to conduct chemical reviews and a master's level toxicologist to research pharmaceutical data. Program funds were also used to pay portions of the salaries for management staff. Staff from other program areas assisted the program with work on environmental impacts, peer review of the work on chemicals, and web publishing.

Contaminants

Chemicals Reviewed

MDH staff developed health based guidance for ten contaminants this biennium, meeting the program's goal of ten reviews per biennium. Depending on the amount and complexity of data available for a chemical, a review may take a few months to about one year. The ten reviews, including several that were very complex, resulted in guidance for:

1. bisphenol A (BPA),
2. butyl benzyl phthalate (BBP),
3. dibutyl phthalate (DBP),
4. microcystin
5. propyl paraben,
6. skatol,
7. sulfamethazine,
8. sulfamethoxazole,
9. triclocarban, and
10. tris(1,3-dichloroisopropyl)phosphate (TDCPP).

Information Sheets for the ten chemicals listed above are provided in Attachment B. Reviews will be conducted in the next biennium on selected substances that have been nominated to the program (status of nominated chemicals is provided in Attachment A).

Chemicals Screened

Screening is a rapid assessment of chemical-specific toxicity and exposure data. Screening can result in final assessments (for example, skatol and propyl paraben) or lead to full reviews. Most screened chemicals continue to be considered for future work.

Screening assessments were completed for twenty-six nominated chemicals, which exceeds the program's goal of screening twenty chemicals per biennium. The twenty-six chemicals are:

1. bupropion,
2. chlorpyrifos,
3. chlorpyrifos oxon,
4. colloidal silver,
5. copper sulfate,
6. 2,4-dichlorophenoxyacetic acid (2-4 D),
7. diquat,
8. endothall,
9. estrone,
10. 17 alpha-ethinylestradiol,
11. fluoxetine,
12. fluoridone,
13. formaldehyde,
14. glyphosate,

15. imazapyr,
16. nanosilver,
17. nonylphenol,
18. nonylphenol mono-ethoxylate (NP1EO),
19. nonylphenol di-ethoxylate (NP2EO),
20. octylphenol,
21. perfluorohexane sulfonate (PFHxS),
22. thiamethoxam,
23. triclopyr,
24. trimethoprim,
25. tris(1,3-dichloroisopropyl)phosphate (TDCPP), and
26. venlafaxine.

As needed, screened chemicals are prioritized for review.

Chemicals Nominated

Twenty chemicals were nominated to the program during the biennium:

1. acrylamide,
2. chlorpyrifos,
3. chlorpyrifos oxon,
4. colloidal silver,
5. diallyl dimethyl ammonium chloride (DADMAC),
6. p-DADMAC,
7. fluoride,
8. fluorosilicic acid,
9. formaldehyde,
10. methyl tertiary butyl ether (MTBE),
11. nanosilver,
12. N-nitrosodimethylamine,
13. PFHxS,
14. sulfamethazine,
15. sulfamethoxazole,
16. tetrahydrofuran,
17. thiamethoxam,
18. tris(2-chloroethyl) phosphate (TCEP),
19. tris(1,3-dichloroisopropyl) phosphate (TDCPP) and
20. tritium.

Some nominated substances have not been selected for review under the CEC program. Refer to Attachment A for additional information and for the status of nominated chemicals.

Environmental Impacts

MDH's CEC program focuses on human health and exposure via drinking water. However, potential impacts to plants and animals that live in water can be different and/or more significant than potential direct impacts to humans. Environmental impacts may be the major reason a chemical was nominated to the CEC program.

Therefore, beginning in 2013, MDH added a statement about the potential environmental impacts from contaminants of emerging concern to new Information Sheets and has expanded coordination with the Minnesota Pollution Control Agency (MPCA) on providing context related to these impacts.

Health Risk Limit Rule Amendment

MDH is currently in the process of amending the current Health Risk Limit rules[2] for Groundwater (*Minnesota Rules*, Parts 4717.7860 and 4717.7500). The proposed amendments add new HRL values for groundwater contaminants to the existing rule or replace outdated HRL values published in 1993 or 1994. Guidance for six chemicals developed through the CEC program during the 2010-11 biennium are included in this rule amendment. These are:

1. 6-Acetyl-1,1,2,4,4,7 hexamethyltetraline (AHTN),
2. carbamazepine,
3. 1,4-dioxane,
4. DEET,
5. 1,2,3-trichloropropane, and
6. TCEP.

Updates related to the amendment have and will continue to be publicized via the GovDelivery email subscription service and on the amendment web page.[3]

Advice and Consultation

Advisory Forum

CEC staff convened two Advisory Forum[4] meetings during the biennium as part of the program's outreach

[2] www.health.state.mn.us/divs/eh/risk/guidance/hrltype.html
[3] www.health.state.mn.us/divs/eh/risk/rules/water/rulerelated.html
[4] www.health.state.mn.us/divs/eh/risk/guidance/dwec/advisory.html

efforts. The objectives of the annual Advisory Forum are to:

- nominate contaminants,
- review the work of the task groups and contracted research projects, and
- provide other program updates.

Meetings of the advisory forum are open to the public. The second annual forum meeting was held on February 9, 2012 and the third annual meeting was held on February 13, 2013. Attendees included representatives from federal, state, and local government units, nonprofit organizations, academic institutions, industry, and the public. The forums provide an opportunity for state and federal agencies and other organizations to provide updates on the work they are conducting related to contaminants of emerging concern. Nominations received at the forum meetings are included in the nominated chemical status table (Attachment A).

At the last forum meeting in February 2013, MDH sought feedback on the outreach materials developed through the program. Forum participants were broken into small groups and asked to discuss the MDH materials they find most useful and how these materials could be improved (for example, to expand materials to include general water quality concepts, provide risk communication tools to utilities, cities and counties).

Communication Task Group

The Communication, Education, and Outreach Task Group[5] (Communication Task Group) comprises representatives from state and federal agencies, industry and nonprofit groups, and academic institutions. This task group met five times during the biennium (October 12, 2011, March 7, 2012, June 6, 2012, November 14, 2012, and April 8, 2013) and will continue to meet on an as needed basis, approximately quarterly. This task group was convened to help MDH:

- develop an outreach plan,
- engage the public, and
- enhance messaging associated with contaminants of emerging concern.

Input from this task group resulted in the initiation of the Baseline Needs Assessment Project[6] that was completed in the FY10-11 biennium. Additionally, this group provided feedback on the format and content of the Information Sheets (Attachment B). MDH does not anticipate convening additional task groups during the coming year, but will periodically assess the need for new task groups.

CCL 4 Nominations

The US Environmental Protection Agency's (EPA) Contaminant Candidate List (CCL) is a list of contaminants that are currently not subject to any proposed or promulgated national primary drinking water regulations, but are known or anticipated to occur in public water systems. Contaminants listed on the CCL may require regulation under the Safe Drinking Water Act (SDWA). The EPA requested nominations of chemical and microbial contaminants for possible inclusion in the fourth drinking water list (CCL 4). MDH staff submitted nominations for microcystin (a substance reviewed under the CEC program) and manganese in response to this request.

Ongoing Collaboration

The work of the program will be facilitated by ongoing collaborative relationships with stakeholders and interested persons as well as by the ongoing work of task groups and the Advisory Forum. Additionally, CEC staff meet regularly with other state and federal agencies regarding monitoring activities, database management, and general coordination and information sharing.

MDH staff also participate in inter-agency CWF meetings and maintain contact with other CWF projects and programs. This coordination helps to achieve CWF outcomes and to provide consistent CWF information for public use, reporting, and administrative procedures. In addition to inter-agency coordination, CEC staff participate in intra-agency planning so that CEC activities are coordinated with

[5] www.health.state.mn.us/divs/eh/risk/guidance/dwec/outreachtaskgroup.html

[6] www.health.state.mn.us/divs/eh/risk/guidance/dwec/baselineneedsproj.html

other CWF-funded MDH programs and integrated into the ongoing work of the department.

Communications

Due to the increasing concern in the scientific and broader community about contaminants of emerging concern in drinking water and the environment, it is a high priority for MDH to communicate with all interested parties about CEC work. To that end, MDH staff are actively engaged in communication and outreach efforts. These efforts include regular web updates, quarterly reports, e-mail updates via a GovDelivery e-mail subscription service, presentations, and development of outreach materials.

Program Website

The CEC program website[7] is updated with new program information on a regular basis. Stakeholders and the general public are encouraged to review the website for information about program activities, a list of chemicals under review, and chemical health and exposure information.

GovDelivery E-mail Subscription Service

The GovDelivery e-mail subscription service provides updates regarding the program and website and also announces public meetings and the availability of contract and grant opportunities. People are encouraged to use the program website to submit their email address to receive these updates. Approximately 2,450 subscribers currently receive these email updates.

Quarterly Reports

Quarterly reports, delivered via the program website, provide summaries of quarterly activities as well as updated nominated chemical status tables.

CWF Performance Report

Minnesota agencies released their first collaborative report in February 2012 to help Minnesotans clarify connections between Clean Water Funds invested, actions taken and outcomes achieved in FY2010-2011. Eighteen measures in the report provide a snapshot of how Clean Water Fund dollars are being spent and what progress has been made. Each measure has detailed status ranking and trend information. The work of the CEC program is highlighted in the CWF Performance Report[8] and the number of guidance values completed for contaminants of emerging concern is included as one of the eighteen measures.

Presentations/Posters/Booths

MDH staff are actively involved in engaging stakeholders and conducting outreach, including presenting at technical conferences and to interested agencies and organizations. During the biennium, MDH staff presented to the following audiences:

- MDH Drinking Water Protection Brown Bag series – August 3, 2011
- MPCA Water Communications Group – August 11, 2011
- MPCA Unusual Wastes Group – September 1, 2011
- MDH Community Health Conference (booth) – September 15&16, 2011
- American Water Works Association MN Conference – September 29, 2011
- Federal-State Toxicology Risk Analysis Committee – October 5, 2011
- Association of State Drinking Water Administrators – October 18, 2011
- MN Water Resources Conference – Oct 19, 2011
- St. Thomas University – Nov 28, 2011
- Association of Minnesota Counties (booth) – December 5 &6, 2012
- Society for Risk Analysis (poster) – Dec 2011
- Minneapolis Home and Garden Show (booth) – March 2 to 4, 2012
- Society of Environmental Toxicology and Chemistry (poster) – March 20, 2012
- MPCA Wastewater Operations Conference – March 23, 2012
- University of MN – April 16, 2012
- Suburban Utility Superintendents Association – April 25, 2012
- Living Green Expo – May 6, 2012
- Minnesota State Fair – August 28, 2012

[7] www.health.state.mn.us/cec

[8] www.legacy.leg.mn/funds/clean-water-fund

- Federal-State Toxicology Risk Analysis Committee – November 15, 2012
- Interagency Risk Assessors– January 23, 2013
- Inland Harmful Algal Bloom Discussion Group – January 24, 2013
- University of MN – February 20, 2013
- University of MN – February 27, 2013
- Clean Water Council – May 20, 2013

Outreach Materials

Outreach materials that summarize exposure and health information are developed for all reviewed chemicals (refer to the Information Sheets[9] webpage for links to chemical Information Sheets or Attachment B). MDH staff also reformatted outreach materials for chemicals reviewed during the 2010-2011 biennium into the new Information Sheet format. The Information Sheets provide a human and ecological health context related to the levels of a chemical being found in water.

Research and Special Projects

As mentioned above, scientific advances in monitoring capabilities and toxicity assessment require new or additional approaches for understanding the source and magnitude of human exposure as well as assessing potential health risks. The CEC program is also involved in several special projects and research to address these needs. Currently, about a third of program funds are intended for special projects, including contracts and grants. Additional information for the projects described below is available on the Special Projects web page.[10] These research projects have the potential to greatly improve how we identify and evaluate contaminants of emerging concern.

Alternative Risk Assessment Project

The purpose of the project is to identify, describe, and assess alternative methods for evaluating the potential toxicity of contaminants that have limited available toxicity information. The results from this project will expand MDH's ability to conduct risk-based prioritization and guidance development. The report for the first phase of this project was completed in July 2012. Staff are using first phase project results to develop benchmarks for selected pharmaceuticals. A second phase of the project will begin in Fall 2013.

Relative Source Contribution

For many contaminants, drinking water is just one of several routes of exposure. For products such as pharmaceuticals and some personal care products, exposure via ingestion or application to the body may result in higher exposure than from drinking water.

Standard practice for developing health-protective guidance includes incorporating a relative source contribution (RSC) factor to account for multiple exposure sources (food, water, air, consumer products) or routes of exposure (ingestion, inhalation, or dermal absorption). The RSC is used to decide how much of exposure is from drinking water so that total exposure does not exceed a safe level.

MDH staff contracted the second phase of this project to evaluate models for quantifying exposures from sources other than drinking water. This project will be finalized in the fall of 2013 and the results will be used to assist MDH staff in determining RSC factors.

Distilled Water Assessment

Some families in Minnesota use bottled distilled water for mixing infant formula if they are concerned about contaminants in their well water or municipal tap water. However, there is currently little information available about contaminants such as plasticizers that may be present in distilled water. In June 2012, the CEC program conducted a small-scale study of bottled distilled water. Twelve containers of water were purchased from retailers in the Twin Cities metro area and sent to the MDH Public Health Lab for analysis.

Toxicity Review

One of MDH's definitions of a contaminant of emerging concern is whether there is new or changing health information available for a chemical. There are approximately 140 chemicals that were evaluated by MDH in the past but have not been revised since 2008. MDH hired a student worker to research whether new toxicity data were available for these chemicals and

[9] www.health.state.mn.us/divs/eh/risk/guidance/dwec/chemunderrev.html

[10] www.health.state.mn.us/divs/eh/risk/guidance/dwec/specproj.html

whether the new data might warrant the reevaluation of a chemical as a CEC . As a result of this work, staff are currently satisfied that none of the older evaluations require immediate attention, however, they will compare recent monitoring data this Fall whether additional review may be warranted.

Outreach and Education Grants

This biennium, the program initiated an outreach and education grant program. Through this grant program, the public may become more aware of contaminants, the health effects of contaminants, the source of contaminants, how personal actions are related to exposure and release of contaminants, how people are exposed to contaminants, the combined effects of multiple exposures or multiple contaminants, or other concepts. Eligible applicants include local, regional, or tribal units of government, non-profit organizations, academic institutions, or professional water resource organizations. Projects funded under the grant may result in community or personal actions, community events, new literature or other media products, or other public engagement activities. Four grants were awarded in the first grant cycle in the spring of 2013 and will be completed by Fall 2013. Applications for a second cycle of funding closed in June 2013.

Public Health Lab

The capacity of MDH's Public Health Lab to analyze contaminants of emerging concern has been expanded through the recent acquisition of personnel and equipment. In February 2013, a new Research Scientist was hired full time to work on method development and analytical consultation for contaminants of emerging concern. Additionally, a mass spectrometer and a high-performance liquid chromatograph were acquired for purpose of method development and analysis for contaminants of emerging concern.

Analytical methods are being developed for several classes of analytes including compounds associated with frac-sand mining, hormones, benzotriazoles, drugs of abuse, and artificial sweeteners. Currently, a majority of the analytical effort is being focused on acrylamide, a chemical of concern at sites where frac-sand is mined and processed in Minnesota.

Brochure Focus Group

In order to assess effectiveness of a brochure that was being developed related to infants and drinking water, focus groups were conducted around the state. Participants were asked to review a draft of the brochure and provide feedback on the content and messaging. Input received will be used to revise the brochure to improve message clarity and the potential for personal action as a result of the information. The information obtained from the focus groups will also be used when developing other materials in the future to maximize the effectiveness of these materials.

Future Research Opportunities

CEC program staff are considering additional projects for future funding including a grant for non-profit organizations to conduct outreach activities, research related to cumulative impacts of chemical exposures, and research using state-of-the-art assays of toxicity.

Summary of Program Highlights

In the 2012-2013 biennium, CEC program staff have:

- completed full review of ten chemicals and screening assessments of twenty-six chemicals,
- developed nine new public information fact sheets on chemicals for which MDH has developed risk advice,
- expanded public information to include context around environmental impacts,
- engaged stakeholders through five task group meetings and two advisory forum meetings,
- coordinated with agency partners to prepare the CWF Performance Report,
- presented on the program at technical conferences and to agencies and organizations,
- communicated monthly with stakeholders subscribing to an email distribution list,
- expanded the capacity of the Public Health Lab,
- completed stages of two research projects intended to improve MDH's analysis of health risks from emerging contaminants,
- completed a focus group project, and
- initiated an outreach and education grant program.

Attachment A

Nominated Contaminants Status Table

Minnesota Department of Health (MDH) Contaminants of Emerging Concern (CEC) Program

Nominated Contaminants Status Table: Fourth Quarter (April - June) Fiscal Year 2013

[Note: MDH does not have a list of contaminants of emerging concern. The table below represents chemicals that have been nominated for potential evaluation by the MDH CEC program.]

Chemical Name [CAS No.[1]]	Information Provided By Nominator				MDH Determination and Status		
	Nominator (Date)	Chemical or Product Class	Exposure Related Information (references for footnotes below)	Toxicity (Human Health Effects) Related Information	Selected for MDH CEC Program[2]?	Current MDH Status	MDH Health-based Guidance Value[3] (ug/L)
Acetaminophen [103-90-2]	MDH CEC Staff (June 2010)	Over-the-counter pharmaceutical.	Has been detected in Minnesota and national monitoring studies (b, c, e)	Can cause liver toxicity.	Yes	Full review completed (Aug 2011)	Acute - 200 Short-term - 200 Subchronic - 200 Chronic - 200 Cancer - NA
Acrylamide [79-06-1]	MDH SAC Staff (March 2013)	Monomer residuals found in polymer homologues which are 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. Arylamide is very soluble, mobile and in groundwater conditions may have very slow biodegradation rates.	Identified as a "likely carcinogen" by EPA.	Yes	Awaiting screening	--
AHTN (6-Acetyl-1,1,2,4,4,7-hexamethyltetraline or Tonalide) [21145-77-7 or 1506-02-1]	MDH CEC Staff (May 2010)	Fragrance	Has been detected in Minnesota and national monitoring studies (a,c,e,).	A suspected potential endocrine disruptor and it has been detected in human breast milk and fat tissues.	Yes	Full review completed (Dec 2010) Included in the possible Health Risk Limit Rules Amendment (July 2012)	Acute - NA Short-term - 200 Subchronic - 40 Chronic - 20 Cancer - NA
Aqua Neat, EPA #228-365 - (active ingredient - Glyphosate)	Citizen (Oct 2011)	Aqua Neat is a non-selective herbicide used to eliminate emerged aquatic weeds. Glyphosate is the active ingredient.	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.	Yes	Screening completed March 2012. Remains on list for future consideration.	--
Aquathol (active ingredient - Endothall)	Citizen (Nov 2011)	Aquathal is a herbicide used to eliminate emerged aquatic weeds. Endothall is the active ingredient.	None provide.	None provided.	Yes	Screening completed March 2012. Remains on list for future consideration.	see Endothall below

Chemical Name [CAS No.[1]]	Information Provided By Nominator				MDH Determination and Status		
	Nominator (Date)	Chemical or Product Class	Exposure Related Information (references for footnotes below)	Toxicity (Human Health Effects) Related Information	Selected for MDH CEC Program[2]?	Current MDH Status	MDH Health-based Guidance Value[3] (ug/L)
Arsenic [7440-38-2]	Citizen (Nov 2010)	Naturally occurring metalloid element used in a variety of industrial products.	None provide.	None provided.	No	Assigned to MDH Health Risk Limits and Guidance program.	US Environmental Protection Agency (EPA) regulatory standard for public drinking water systems is 10 ug/L
Bisphenol A (BPA) [80-05-7]	Preventing Harm Minnesota (Jan 2011); MDH staff (Toxic Free Kid Act priority chemical) (Feb 2011) and MPCA[5] (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.	Yes	Full review completed (November 2012).	Acute - 300 Short-term - 300 Subchronic - 100 Chronic - 100 Cancer - NA
Bupropion [34841-39-9]	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.	Yes	Screening completed (December 2011). Remains on list for future consideration.	--
Butyl benzyl phthalate (BBP) [85-68-7]	MDH staff (Toxic Free Kid Act priority chemical) (Feb 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.	Yes	Full review completed (Oct 2012).	Acute - 100 Short-term - 100 Subchronic - 100 Chronic - 100 Cancer - NA
Cadmium [7440-43-9]	MDH staff (Toxic Free Kid Act priority chemical) (Feb 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.	No	Screening completed (April 2011). Assigned to MDH Health Risk Limits and Guidance program.	Chronic – 4 (1993 HRL), Re-evaluation of value is warranted.

Chemical Name [CAS No.[1]]	Information Provided By Nominator				MDH Determination and Status		
	Nominator (Date)	Chemical or Product Class	Exposure Related Information (references for footnotes below)	Toxicity (Human Health Effects) Related Information	Selected for MDH CEC Program[2]?	Current MDH Status	MDH Health-based Guidance Value[3] (ug/L)
Carbamazepine [298-46-4]	MDH CEC Staff (May 2010) and 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.	Yes	Full review completed (June 2011). Included in the possible Health Risk Limit Rules Amendment (July 2012)	Acute - 40 Short-term - 40 Subchronic - 40 Chronic - 40 Cancer - NA
Chlorpyrifos [2921-88-2]	MDA and MDH staff (Jan 2013)	Organophosphorus Insecticide	In April 2012 MDA determined that chlorpyrifos was a surface water pesticide of concern unde 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.	Yes	Screening completed (March 2013). Selected for full review (June 2013).	Chronic – 20 (1995 HBV). Re-evaluation of value is warranted.
Chlorpyrifos oxon [5598-15-2]	MDA and MDH staff (Jan 2013)	Water treatment transformation product of chlorpyrifos	See chlorpyrifos	No MDH human health-based guidance.	Yes	Screening completed (March 2013). Selected for full review (June 2013).	--
Copper sulfate [7758-98-7, 7758-99-8, 1344-73-6, or 1332-14-5]	Citizen (Nov 2011)	Copper sulfate is used as a 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.	Yes	Screening completed (Sept 2012). Remains on list for future consideration.	--
Colloidal silver [9015-51-4]	Clean Water Action (Jan 2012)		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.	Yes	Completed screening (Sept 2012). Remains on list for future consideration.	
Decabromodiphenyl ether (decaBDE) [1163-19-5]	MDH staff (Toxic Free Kid Act priority chemical) (Feb 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 breaksdown into congeners that are persistent, bioaccumulative and toxic.	Yes	Screening completed (April 2011). Remains on list for future consideration.	--

Chemical Name [CAS No.[1]]	Information Provided By Nominator				MDH Determination and Status		
	Nominator (Date)	Chemical or Product Class	Exposure Related Information (references for footnotes below)	Toxicity (Human Health Effects) Related Information	Selected for MDH CEC Program[2]?	Current MDH Status	MDH Health-based Guidance Value[3] (ug/L)
DEET (N,N-Diethyl-meta-toluamide) [134-62-3]	MDH CEC Staff (May 2010) and 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. In laboratory animals high doses have reported to cause neurological effects.	Yes	Full review completed (Dec 2010) Included in the possible Health Risk Limit Rules Amendment (July 2012)	Acute - NA Short-term - 200 Subchronic - 200 Chronic - 200 Cancer - NA
Diallyl dimethyl ammonium chloride (DADMAC) [7398-69-8]	MDH SAC Staff (March 2013)	Monomer residuals found in polymer homologues which are 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.	Identified as a "reasonably anticipated human carcinogen" by EPA. Has been listed on EPA's UCMRL2 and CCL3.	Yes	Awaiting screening	--
Dibutyl phthalate (DBP) [84-74-2]	MDH staff (Toxic Free Kid Act priority chemical) (Feb 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.	Yes	Full review completed (Oct 2012).	Acute - 20 Short-term - 20 Subchronic - 20 Chronic - 20 Cancer - NA
2,4-D (2,4-Dichlorophenoxyacetic acid) [94-75-7]	Citizen (Oct 2011)	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.	2,4-D is used as an aquatic herbicide in lakes.	Concerned about the long-term effects to both aquatic organisms, human health and groundwater.	Yes	Screening completed Jan. 2012. Remains on list for future consideration.	Chronic - 70 (1993 HRL). Re-evaluation of value is warranted.
Di(2-ethylhexyl)phthalate (DEHP) [117-81-7]	MDH staff (Toxic Free Kid Act priority chemical) (Feb 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.	Yes	Selected for full review (Sept 2011). Full review reinitiated (Oct 2012).	Chronic – 6 (MCL HRL). Re-evaluation of value is warranted.
Diquat [85-00-7]	Citizen (Oct 2011)	Diquat bromide is a non-selective contact algicide, defoliant, desiccant and herbicide.	Diquat is used as an aquatic herbicide in lakes.	Concerned about the long-term effects to both aquatic organisms, human health and groundwater.	Yes	Screening completed March 2012. Remains on list for future consideration.	- -

Chemical Name [CAS No.[1]]	Information Provided By Nominator				MDH Determination and Status		
	Nominator (Date)	Chemical or Product Class	Exposure Related Information (references for footnotes below)	Toxicity (Human Health Effects) Related Information	Selected for MDH CEC Program[2]?	Current MDH Status	MDH Health-based Guidance Value[3] (ug/L)
1,4-Dioxane [123-91-1]	MDH CEC Staff (June 2010)	Solvent additive; manufacturing byproduct in personal care products.		An EPA toxicological review was finalized and released in August 2010. The new analysis found cancer to be much more likely than previously thought.	Yes	Full review completed (June 2011) Included in the possible Health Risk Limit Rules Amendment (July 2012)	Acute - NA Short-term - NA Subchronic - 300 Chronic - 100 Cancer - 1
Endothall [acid: 145-73-3; dipotassium salt: 2164-07-0; N,N-dimethylalkylamine salt: 66330-88-9]	Citizen (Oct 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.	Concerned about the long-term effects to both aquatic organisms, human health and groundwater.	Yes	Screening completed March 2012. Remains on list for future consideration.	- -
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.	Yes	Screening completed (November 2011). Remains on list for future consideration.	- -
17 alpha-Ethinylestradiol [57-63-6]	MPCA[5] (April 2011)	Synthetic hormone (oral contraceptive).	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 feminzation of fish are cause for concern.	Yes	Screening completed (October 2011). Remains on list for future consideration.	- -
Fluoxetine [54910-89-3]	MPCA[5] (April 2011)	Selective serotonine reuptake inhibitor (SSRI) antidepressant (e.g., Prozac).	Has been detected in Minnesota surface waters.	Low threshold (parts per trillion concentration) for bioactivity in fish (i.e., slowed stress response, predator avoidance behavior) raises concerns.	Yes	Screening completed (Sept 2011). Remains on list for future consideration.	- -

Chemical Name [CAS No.[1]]	Information Provided By Nominator				MDH Determination and Status		
	Nominator (Date)	Chemical or Product Class	Exposure Related Information (references for footnotes below)	Toxicity (Human Health Effects) Related Information	Selected for MDH CEC Program[2]?	Current MDH Status	MDH Health-based Guidance Value[3] (ug/L)
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.	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.	No	Two Federal agencies are currently evaluating current fluoride science. The EPA is conducting new health and exposure assessments. The US Department of Health and Human Services is finalizing an optimum fluoride concentration recommendation that will continue to prevent tooth decay while reducing excessive exposure by children.	Additional information on the recent EPA fluoride health effects and exposure assessments can be found here.
Fluorosilicic acid [16961-83-4]	Citizen (April 2012)	Used as fluoridation agent for drinking water.	(see Fluoride)	(see Fluoride)			
Fluridone [59756-60-4]	Citizen (Nov 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.	Yes	Screening completed March 2012. Remains on list for future consideration.	- -
Formaldehyde [50-00-0]	MDH staff (Toxic Free Kid Act priority chemical) (Feb 2011) and MPCA[5] (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.	Yes	Screening completed (March 2011). Remains on list for future consideration.	Chronic – 1000 (1994 HRL)
Glyphosate - Nominated as Aqua Neat, EPA #228-365 [1071-83-6]	Citizen (Oct 2011)	Glyphosate is the a non-selective herbicide and is the active ingredient in Aqua Neat 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.	Yes	Screening completed Feb 2012. Remains on list for future consideration.	- -
Hexabromocyclododecane (HBCD) [3194-55-6]	MDH staff (Toxic Free Kid Act priority chemical) (Feb 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.	Yes	Screening completed (March 2011). Remains on list for future consideration.	--

Chemical Name [CAS No.[1]]	Information Provided By Nominator				MDH Determination and Status		
	Nominator (Date)	Chemical or Product Class	Exposure Related Information (references for footnotes below)	Toxicity (Human Health Effects) Related Information	Selected for MDH CEC Program[2]?	Current MDH Status	MDH Health-based Guidance Value[3] (ug/L)
Imazapyr [81334-34-1]	Citizen (Nov 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.	Yes	Screening completed March 2012. Remains on list for future consideration.	--
Lead [7439-92-1]	Citizen (Nov 2010) and MDH staff (Toxic Free Kid Act priority chemical) (Feb 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.	To Be Determined	Screening assessment completed (April 2011), Standard threshold risk assessment methods not applicable. Internal discussion regarding feasibility of alternative assessment approaches.	Additional information on lead in drinking water can be found on US Environmental Protection Agency's web site.
Mercury, inorganic [7439-97-6]	Citizen (Nov 2010)	Naturally occurring metal-element used in a variety of industrial products.	None provided	None provided	No	Assigned to MDH Health Risk Limits and Guidance program.	--
Methyl tertiary butyl ether (MTBE) [1634-04-4]	Clean Water Action (March 2012)	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.	No	Currently under review by MDH Health Risk Limits program.	--
Metribuzin degradates - Metribuzin DA [35045-02-4], Metribuzin DK [56507-35-0], Metribuzin DADK [52236-30-3]	MDH CEC Staff in consultation with MDA[4] staff (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 effect development, the nervous system and hormone levels.	Yes	Full review completed (July 2010)	Use guidance values for metribuzin. Acute - 40 Short-term - 10 Subchronic - 10 Chronic - 10 Cancer - NA
Mining related contaminants	Citizen (Jan 2011)		None provided	None provided.	No	Insufficient information.	
Mixtures (of compounds)	Citizen (Feb 2012)		Research on impacts from exposure to mixtures of compounds (particularly endocrine active compounds) has been conducted on fish.	None provided.	Insufficient information.	MDH does have a procedure for assessing the risk from exposure to multiple chemicals.	--

Chemical Name [CAS No.[1]]	Information Provided By Nominator				MDH Determination and Status		
	Nominator (Date)	Chemical or Product Class	Exposure Related Information (references for footnotes below)	Toxicity (Human Health Effects) Related Information	Selected for MDH CEC Program[2]?	Current MDH Status	MDH Health-based Guidance Value[3] (ug/L)
Microcystin-LR [77238-39-2]	MPCA[5] (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.	Yes	Full review completed (September 2012)	Acute - NA Short-term - 0.04 Subchronic - 0.04 Chronic - 0.04 Cancer - NA
Nanosilver [94161-97-2]	Clean Water Action (Jan 2012)		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.	Yes	Screening completed (Sept 2012). Remains on list for future consideration.	
N-Nitrosodimethylamine (NDMA) [62-75-9]	MDH SAC Staff (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.		Yes	Awaiting screening	--
Nonylphenol [84852-15-3]	MPCA[5] (April 2011)	Detergent/ surfactant (degradate of NP1EO and NP2E0).	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.	Yes	Screening completed (October 2011). Remains on list for future consideration.	- -
Nonylphenol mono-ethoxylate (NP1EO) [27986-36-3]	MPCA[5] (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	Yes	Screening completed (October 2011). Remains on list for future consideration.	- -
Nonylphenol di-ethoxylate (NP2EO) [20427-84-3]	MPCA[5] (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	Yes	Screening completed (October 2011). Remains on list for future consideration.	- -
Octylphenol [140-66-9]	MPCA[5] (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.	Yes	Screening completed (October 2011). Remains on list for future consideration.	- -

Chemical Name [CAS No.[1]]	Information Provided By Nominator				MDH Determination and Status		
	Nominator (Date)	Chemical or Product Class	Exposure Related Information (references for footnotes below)	Toxicity (Human Health Effects) Related Information	Selected for MDH CEC Program[2]?	Current MDH Status	MDH Health-based Guidance Value[3] (ug/L)
Perfluorohexane sulfonate (PFHxS) [355-46-4]	MDH SAC Staff (May 2013)	Perfluorinated chemical	Groundwater contaminant in the East Metro area. Has been detected in community drinking water wells. Soluble, mobile and persistent in the environment.	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.	Yes	Completed screening (June 2013).	- -
Polydiallyl dimethyl ammonium chloride (pDADMAC) [26062-79-3]	MDH SAC Staff (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.		Yes	Awaiting screening	--
Propyl paraben [94-13-3]	MDH CEC Staff (May 2010)	Food additive and consumer products.		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.	Yes	Screening completed (Dec 2010). No further review anticipated due to insufficient toxicity information.	--
Pyraclostrobin [175013-18-0]	MDH CEC Staff in consultation with MDA[4] staff (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.	Yes	Full review completed (Aug 2011)	Acute - 300 Short-term - 100 Subchronic - 100 Chronic - 100 Cancer - NA
Skatol (3-Methyl-1H-Indole) [83-34-1]	MDH CEC Staff (Aug 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.	Yes	Screening completed (Dec 2010). No further review anticipated due to insufficient toxicity information.	--
Sulfamethazine [57-68-1]	MDH CEC Staff (March 2013)	Antibiotic primarily used as a veterinary antibacterial drug in food animals.		Similar chemical structure and toxicological profile as sulfamethoxazole.	Yes	Full review completed (June 2013).	Acute - ND Short-term - 100 Subchronic - 100 Chronic - 100 Cancer - NA

Chemical Name [CAS No.[1]]	Information Provided By Nominator				MDH Determination and Status		
	Nominator (Date)	Chemical or Product Class	Exposure Related Information (references for footnotes below)	Toxicity (Human Health Effects) Related Information	Selected for MDH CEC Program[2]?	Current MDH Status	MDH Health-based Guidance Value[3] (ug/L)
Sulfamethoxazole [723-46-6]	MDH CEC Staff (July 2010) and MPCA[5] (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.	Yes	Full review completed (June 2013).	Acute - ND Short-term - 100 Subchronic - 100 Chronic - 100 Cancer - NA
Tetrahydrofuran [109-99-9]	MPCA5 (July 2012)	Industrial solvent for PVC and varnishes.	Has been detected in Minnesota groundwater.	New EPA IRIS Toxicological Review document was posted Feb. 2012. Currently there is no HRL value for this chemical.	Yes	Awaiting screening	Chronic - 100 (HBV 1995).
Thiamethoxam [153719-23-4]	Citizen (June 2012)	Pesticide	A common pesticide which decreases foraging success and survival in honey bees.	May contribute to colony collapse disorder in honey bees. Concerned about what direct health effects it may have on humans.	Yes	Screening completed (February 2013). Remains on list for future consideration.	--
1,2,3-Trichloropropane [96-18-4]	MDH CEC Staff (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.	Yes	Full review completed (July 2010). Included in the possible Health Risk Limit Rules Amendment (July 2012)	Acute - 20 Short-term - 20 Subchronic - 10 Chronic - 10 Cancer - 0.003
Triclocarban [101-20-2]	MDH CEC Staff (Aug 2010)	Antimicrobial		Potential for male reproductive effects based on animal studies. Also has caused adverse effects in the spleen, bone marrow, liver and kidney.	Yes	Full review completed (May 2013)	Acute - ND Short-term - ND Subchronic - ND Chronic - 100 Cancer - NA
Triclopyr [55335-06-3]	Citizen (Nov 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.	Yes	Screening completed March 2012. Remains on list for future consideration.	Chronic - 300 (HBV 1999).
Triclosan [3380-34-5]	MDH CEC Staff (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.	Yes	Full review completed (July 2010).	Acute - 200 Short-term - 50 Subchronic - 50 Chronic - 50 Cancer - NA

Chemical Name [CAS No.[1]]	Information Provided By Nominator				MDH Determination and Status		
	Nominator (Date)	Chemical or Product Class	Exposure Related Information (references for footnotes below)	Toxicity (Human Health Effects) Related Information	Selected for MDH CEC Program[2]?	Current MDH Status	MDH Health-based Guidance Value[3] (ug/L)
Trimethoprim [738-70-5]	MPCA[5] (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).		Yes	Screening completed (Sept 2011). Remains on list for future consideration.	- -
Tris(2-chloroethyl) phosphate (TCEP) [115-96-8]	MDH CEC Staff (May 2010) and MPCA5 (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).	Yes	Full review completed (May 2011) Included in the possible Health Risk Limit Rules Amendment (July 2012)	Acute - NA Short-term - 300 Subchronic - 200 Chronic - 200 Cancer - 5
Tris(1,3-dichloroisopropyl) phosphate (TDCPP) [13674-87-8]	MDH CEC Staff (Dec 2011) and MPCA[5] (July 2012)	Flame retardant, phosphated.	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 GW Monitoring list. Has been detected in Minnesota surface and ground water.	Recently added to Calif. Prop. 65 carcinogen list.	Yes	Full review completed (April 2013).	Acute- ND Short-term - ND Subchronic - 20 Chronic - 9 Cancer - 0.8
Tritium [10028-17-8]	Citizen (May 2012)	Radioactive isotope of hydrogen	The Vermont Nuclear power plant is leaking tritium into their drinking water.		No	Current levels detected in Minnesota are below EPA's current Maximum Contaminant Level (MCL). No new toxicity information is available that would warrant review. MDH maintains a monitoring program for radioactivity around nuclear power plants in the state.	EPA Office of Water has an MCL of 4 millirem/yr MDH nuclear power plant environmental monitoring reports
Venlafaxine [93413-69-5]	MPCA[5] (April 2011) and Citizen (June 2011)	Serotonin-norepinephrine reuptake inhibitor (SNRI) antidepressant (e.g., Effexor).	Has been detected frequently in Minnesota surface waters downstream from wastewater treatment plants.	Low threshold (parts per trillion concentration) for bioactivity in fish (i.e., slowed stress response, predator avoidance behavior) raises concerns.	Yes	Screening completed (Sept 2011). Remains on list for future consideration.	- -

Chemical Name [CAS No.[1]]	Information Provided By Nominator				MDH Determination and Status		
	Nominator (Date)	Chemical or Product Class	Exposure Related Information (references for footnotes below)	Toxicity (Human Health Effects) Related Information	Selected for MDH CEC Program[2]?	Current MDH Status	MDH Health-based Guidance Value[3] (ug/L)

[1] Chemical Abstracts Service Registry Number. To locate check ChemIDplus Advanced via United States National Library of Medicine (http://chem.sis.nlm.nih.gov/chemidplus/)

[2] Yes: Substance that has the potential to migrate to or be detected in Minnesota water (surface and groundwater) and for which health-based guidance does not exist or needs to be updated due to change in or new toxicity information. Other conditions are described in the table.
No: already under consideration or assigned to another MDH program.
To be determined subsequent to screening assessment

[3] The Minnesota Department of Health (MDH) develops health-based rules and guidance to evaluate potential human health risks from exposures to chemicals in water. The complete list of MDH Human Health-based Water Guidance see: http://www.health.state.mn.u

[4] MDA – Minnesota Department of Agriculture

[5] MPCA – Minnesota Pollution Control Agency

Citations Supplied by Nominators

(a) American Water Works Association Research Foundation 2008. Toxicological Relevance of EDCs and Pharmaceuticals in Drinking Water. http://www.waterresearchfoundation.org/research/TopicsAndProjects/projectProfile.aspx?pn=3085

(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/en/chemicals/pesticides/chlorpyrifos.aspx

Attachment B

Information Sheets

- Bisphenol A
- Butyl Benzyl Phthalate and Dibutyl Phthalate
- Microcystin
- Propyl Paraben
- Skatol
- Sulfamethazine and Sulfamethoxazole
- Triclocarban
- Tris(1,3-dichloroisopropyl)phosphate

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Bisphenol A in Drinking Water

Bisphenol A (BPA) is a common industrial chemical used in many consumer products. In 2011, BPA was listed as one of the Toxic Free Kids Act Priority Chemicals because it is endocrine active, infants and children are more likely to be exposed, it is widely used, and it has been found widely in people.[1] BPA has the potential to be present in drinking water sources in Minnesota. The Minnesota Department of Health (MDH) developed a health-based guidance value for BPA in drinking water and does not expect levels of BPA in drinking water to harm Minnesotans.

What is BPA?

BPA is a chemical that is used in the manufacture of hard, rigid plastics and epoxy resins. It can be found in plastic household products, the linings of food cans, some dental sealants, and in thermal receipt/printer paper. Until a few years ago, BPA was common in hard plastic baby bottles, but manufacturers have recently switched to other materials. The state of Minnesota implemented a ban on BPA in children's bottles and cups in 2010 and the Federal and Drug Administration (FDA) banned these uses in 2012. BPA is *not* used in soft, flexible plastics used in many food containers and toys. Plastics made with BPA will usually have a recycling code of #7 (for "other plastics,") but not all #7 plastics contain BPA. BPA meets the definition of a Priority Chemical under the Toxic Free Kids Act.[1]

How much BPA is in Minnesota drinking water?

BPA is not routinely monitored in Minnesota drinking water, but some studies have found it at low levels in residential and municipal drinking water wells.[2,3] The U.S. Environmental Protection Agency (EPA) reports that BPA concentrations in U.S. drinking water are typically below 1 part per billion (ppb).[4]

Has BPA been found in other waters in Minnesota?

BPA has occasionally been found in shallow monitoring wells at up to 4.5 ppb,[5] and in wastewater effluent at up to 22 ppb.[6,7] It has also been found at less than 0.1 ppb in several Minnesota streams and rivers that receive wastewater, and at 3.2 ppb in Lake Superior.[6]

What is the MDH guidance value for BPA in drinking water?

Based on the best available data, MDH has derived guidance values of 300 ppb for short-term exposures (up to 30 days) and 100 ppb for longer exposures (up to a lifetime.) A person drinking water at or below these levels would have little or no risk of any health effects from BPA.[8]

At a Glance

BPA is…

- A chemical used in some plastics, food can linings, thermal receipt paper, and dental sealants.

BPA enters your body from…

- Eating canned food, or food that has been in contact with plastics containing BPA.
- Ingestion of house dust or breast milk, contact with thermal receipt paper, or use of dental sealants.

Your exposure to BPA can be reduced by….

- Avoiding older baby bottles that predate the Minnesota BPA ban.
- Avoiding reusable water bottles that contain BPA.
- Switching to food in glass jars or fresh or frozen foods instead of canned, or choosing BPA-free cans, if available.
- Washing your hands frequently if you handle a lot of thermal paper or cash.

BPA in drinking water is safe if…

- The level is lower than the MDH guidance values.

Can BPA in drinking water affect my health?

BPA in drinking water is not likely to affect your health. Current data indicate that BPA is not common in drinking water sources, and the levels of BPA that are sometimes found are below MDH guidance values. For most people, exposure from food and consumer products will be greater than exposure from water. These non-water exposures are also below a level that would be a health concern. However, BPA exposure in drinking water contributes to your cumulative exposure.

How are people exposed to BPA?

Most people are exposed to BPA mainly through food.[9] BPA enters the food supply through contact with materials containing BPA, such as the resins that line the inside of food cans. Infants can be exposed from breast milk or from canned formula. Plastic baby bottles were once a major source of BPA exposure for infants, but this exposure is likely to decrease as BPA baby bottles are phased out. BPA is present on the surface of thermal receipt paper and can enter the body through the skin or from hand-to-mouth contact. BPA can transfer from receipts to paper currency in your wallet. Dental sealants can be a source of exposure for a short time after they are applied. Indoor air and house dust can contain small amounts of BPA. Infants, toddlers, and children have higher levels of BPA exposure than adults.[9,10]

How does BPA get into the environment?

Most of the BPA released by industry goes to landfills, and some studies have found high levels of BPA in water leaching out of landfills. Some municipal wastewater in Minnesota contains BPA at low concentrations.[5,6] Some studies from other countries have found high levels of BPA in wastewater from paper recycling. Toilet paper made from recycled paper can be a source of BPA in wastewater, but this type of recycling does not appear to be common in the United States.

How long does BPA stay in the environment?

In surface water, BPA breaks down over a period of a few days. It is not likely to build up over time in the bodies of fish or other animals.

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Phthalates in Drinking Water

Phthalates are chemicals that many Minnesotans, particularly children, are exposed to on a daily basis. In 2011, three phthalates, butyl benzyl phthalate (BBP), dibutyl phthalate (DBP) and di (2-ethyhexyl) phthalate (DEHP), were listed as Toxic Free Kids Act Priority Chemicals because they are endocrine active, infants and children are more likely to be exposed, they are widely used, and they have been found widely in people.[1] Phthalates have the potential to be present in drinking water sources in Minnesota. The Minnesota Department of Health developed health-based guidance values for BBP and DBP in drinking water and does not expect levels of these chemicals in drinking water to harm Minnesotans. MDH is currently reviewing DEHP.

What are phthalates?

Phthalates are manufactured chemicals added to polyvinyl chloride (PVC) plastics, paints, cosmetics, wood varnish, and medical supplies to increase flexibility or improve other characteristics, such as durability. In addition to being in consumer products, phthalates are pervasive in the environment and have been found in food, drinking water, household dust, and indoor air.[1] It is likely that children's mouthing, chewing and crawling behaviors result in greater relative exposure to phthalates when compared to adults. Phthalate exposure can occur through ingestion, inhalation, and direct contact.[1] They are used in large quantities in the United States, and studies of phthalates in urine show that almost everyone is exposed. BBP, DBP, and DEHP meet the definition of a Priority Chemical under the Toxic Free Kids Act.[1] MDH has completed review of BBP and DBP in drinking water and is currently reviewing DEHP.

How much BBP and DBP are in Minnesota drinking water?

To date, neither BBP nor DBP have been detected in drinking water in Minnesota. BBP has been found at less than 1 part per billion (ppb) and DBP has been found at less than 10 ppb in other states.[2]

Have BBP or DBP been found in other waters in Minnesota?

There is little data on either BBP or DBP in Minnesota waters. In other states, they have been found at very low levels (BBP generally below 2 ppb and DBP generally below 10 ppb) in surface water and groundwater.

What are MDH's water guidance values for BBP and DBP?

Based on new information, and accounting for endocrine (hormonal), reproductive, and developmental effects, MDH derived drinking water guidance values of 100 ppb for BBP and 20 ppb for DBP.[3] A person drinking water at or below these levels, whether briefly, occasionally, or daily for a lifetime, would have little or no risk of health effects.

At a Glance

Phthalates are…

- Chemicals used in plastics with recycling code #3, household materials, and consumer products.

Phthalates enter your body from…

- Eating food that has been in contact with plastic containers and wrap.
- House dust (infants and children).
- Using consumer products that contain phthalates.

To reduce your exposure to phthalates[4]…

- Avoid processed, fatty foods.
- Choose phthalate-free toys and beauty products.
- Avoid plastics with recycling code #3 and do not eat or microwave food in plastics with recycling code #3.
- Use PVC-free food storage and building materials.

BBP and DBP in drinking water are safe if…

- Levels are lower than the MDH guidance values of 100 ppb and 20 ppb respectively.

The BBP guidance value is the same as a value MDH developed in 1993, but the DBP guidance value is 35 times lower than the 1993 guidance.

How are people exposed to BBP and DBP?

People are exposed to BBP and DBP mainly through foods that are packaged in plastic.[5] BBP and DBP can also enter food products when they are taken up by crops as they grow.[6] There are no phthalate labeling requirements, so you may not be able to tell if a specific product contains phthalates. However, the 2008 Consumer Product Safety Improvement Act limits the use of certain phthalates in some children's toys and products.[7] BBP and DBP do not build up in the human body, so detection in urine samples is a sign of recent or continuous exposure.[8]

Can BBP and DBP in drinking water affect my health?

The levels of BBP and DBP found in drinking water are not likely to affect your health. Exposure from food, house dust, and consumer products will be far greater than exposure from water. For most people, these non-water exposures are below a level that would be a health concern. However, exposure to phthalates contributes to your cumulative exposure to all chemicals in the environment.

How do BBP and DBP get into the environment?

BBP and DBP can be released during manufacturing of plastic products. Information on industrial releases of BBP is only available from 1988 to 1993 and of DBP from 1991 to 2001. During those periods, releases in Minnesota were small and came from incineration or landfill disposal, and no releases to water were reported.[9]

Since many consumer products contain phthalates, household air and dust can also contain phthalates. Household wastewater can contaminate surface water with phthalates. Many of the plastic products and building materials we use end up in landfills, and this can be another source of phthalates in the environment.

How long do BBP and DBP stay in the environment?

BBP and DBP in the environment may break down over a period of days to weeks. BBP and DBP can form strong attachments to soil and sediment, so they do not tend to move rapidly into groundwater. They do not build up in the bodies of fish or other animals.

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Microcystin-LR in Drinking Water

Microcystin-LR is a contaminant that has been found in waters that could be used as drinking water sources in Minnesota. The Minnesota Department of Health (MDH) developed a health-based guidance value for microcystin-LR in drinking water in order to better understand the potential health risks.

What is microcystin-LR?

Microcystin-LR is a toxin produced naturally by cyanobacteria, also known as "blue-green algae." When excess cyanobacteria grow in a lake or pond, they form an algal bloom, which often appears as a layer of green scum. However, not all green scum on a lake is an algal bloom, and not all algal blooms contain the kinds of cyanobacteria that produce microcystin-LR. There are dozens of types of microcystin; Microcystin-LR is one of the more toxic and well-studied varieties.

How much microcystin-LR is in Minnesota drinking water?

To date, microcystin-LR has not been detected in groundwater or treated drinking water in Minnesota.

Have microcystins been found in other waters in Minnesota?

Microcystins are sometimes found in Minnesota lakes when algal blooms are present. For example, microcystins were detected at 133 parts per billion (ppb) at the surface of Budd Lake in Fairmont during an active algal bloom in 2008. The lake is a drinking water source, but treated drinking water had no detectable microcystins. In 2011, MDH reported on an algal bloom and microcystin contamination in Little Rock Lake in Benton County. Microcystins were not detected in nearby shallow wells.[1]

What is the MDH guidance value for microcystin-LR?

Based on available data, MDH has derived a guidance value of 0.04 ppb for microcystin-LR in drinking water.[2] A person drinking water at or below this level, whether briefly, occasionally, or daily for a lifetime, would have little or no risk of any health effects from microcystin-LR. MDH currently recommends that this guidance for microcystin-LR be used for total microcystins. This guidance is lower than current laboratory detection limits. MDH is currently doing water testing and will check for improved test methods that can meet the guidance values.

Can microcystin-LR in drinking water affect my health?

Microcystin-LR is highly toxic, and even drinking a small amount could be harmful to the liver. Drinking water treatment facilities in Minnesota

At a Glance

Microcystin-LR is…

- A chemical produced by cyanobacteria ("blue-green algae") that can grow in lakes and rivers.

Microcystin-LR enters your body from…

- Drinking untreated water affected by cyanobacteria.
- Contact with water affected by cyanobacteria.
- Possibly from dietary supplements made from algae.

Your exposure to microcystin-LR can be reduced by….

- Keeping yourself and your pets away from lakes and rivers with green scum. Wash thoroughly if you come in contact with these waters.
- Use caution and consult your doctor about risks when considering whether to take algae supplements.
- Eat fish caught from lakes with active algal blooms in moderation.

Microcystin-LR in drinking water is safe if…

- The level is lower than the MDH guidance value of 0.04 ppb.

do not usually test for microcystins, but treatment seems effective at removal. Boiling drinking water will not remove or destroy microcystins.

How can I be exposed to microcystins?

You may be exposed to low levels of microcystins through recreational activities such as swimming or boating. Exposure can occur through skin contact, swallowing lake water, or breathing water spray. Your exposure will depend on whether there is an active algal bloom in the water. Children are more likely than adults to be exposed through these routes.

MDH's Fish Consumption Advisory program is keeping up to date on current research on microcystins in fish. Microcystins do not appear to build up in the edible parts of fish.[3] As a precaution, the Minnesota Pollution Control Agency (MPCA) recommends that fish caught from lakes with active algal blooms be consumed in moderation.

Microcystin-LR and other microcystins have been found in dietary supplements made from algae.[4,5,6] Contamination is more likely when the algae is harvested from a natural source.[5]

How can I avoid exposure to microcystins?

MDH[7] and the MPCA[8] recommend that people and pets avoid contact with lake water affected by algal blooms. This includes drinking, swimming, and watering lawns and gardens. Not all blooms contain microcystins, but it is impossible to tell if a bloom is toxic by sight.

Studies have shown that dietary supplements made from algae may contain unhealthy levels of microcystins. Dietary supplements are not regulated as strictly as prescription or non-prescription drugs. Carefully consider the source of your supplements and the potential risks.

How do microcystins get into the environment?

Microcystins are naturally occurring chemicals. Human actions, such as overloading lakes with nutrients from fertilizer or wastewater, can feed algal blooms and increase microcystins in surface water. Algal blooms are symptoms of an unhealthy lake. They can change the biological balance of lakes by blocking sunlight, altering nutrient content, and depleting oxygen. Microcystin concentrations in an impacted lake can vary greatly with location and time, and may "flare up" quickly and then decline again. Most microcystins are bound inside the living cyanobacteria cell. When the cells die, the microcystins can be released to water. Under most conditions, microcystins outside the cell will degrade in about one week.

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Propyl Paraben in Drinking Water

Propyl paraben is a contaminant that may be in water that could be used as drinking water in Minnesota. The Minnesota Department of Health (MDH) found that there is not enough information about the health effects of propyl paraben to develop a guidance value.

What is propyl paraben?

Propyl paraben is used as a preservative in packaged food products, pharmaceuticals, and personal care products.

How much propyl paraben is in Minnesota water?

MDH believes propyl paraben might be a common contaminant in water because it is widely used. However, there is no information about levels in Minnesota waters.

What is the MDH guidance value for propyl paraben in drinking water?

MDH did not develop a guidance value for propyl paraben because there is not enough information about potential health effects from exposure in drinking water. If more information becomes available, MDH may consider further review of propyl paraben.

How can I safely use products containing propyl paraben?

Parabens may be listed on personal care products as propyl paraben, methyl paraben, butyl paraben, or ethyl paraben. Propyl paraben may also be listed as "propyl p-hydroxybenzoate" or "propyl parahydroxybenzoate," especially on food or beverage labels. Avoid this products if you are concerned about exposure.

What health information was found about propyl paraben?

Propyl paraben may mimic the effects of estrogen, a hormone in the human body. However, these effects were seen only in laboratory animals when propyl paraben was injected under the skin, not when consumed in the diet. There is not enough to understand what these results mean for human health.

At a Glance

Propyl paraben is…

- used as a preservative in packaged food products, pharmaceuticals, and personal care products.

Propyl paraben enters your body from…

- eating food and using personal care products which contain propyl paraben.

Your exposure to propyl paraben can be reduced by….

- avoiding products that contain parabens.

MDH did not develop health based guidance for propyl paraben because…

There is currently not enough information about the health effects from propyl paraben in drinking water.

The Contaminants of Emerging Concern (CEC) Program…

Evaluates health risks from contaminants in drinking water.

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Skatol in Drinking Water

Skatol is a contaminant that has been found in surface waters that could be used as drinking water sources in Minnesota. Skatol has not been found in drinking water. The Minnesota Department of Health (MDH) found that there is not enough information about the health effects of skatol to develop a guidance value.

What is skatol?

Skatol is a fragrance ingredient used in consumer products such as soaps, detergents, lotions, and perfumes. It is also used as an artificial flavor in food products such as non-alcoholic beverages, ice cream, candy, baked goods, and chewing gum. Skatol has an unpleasant odor at high concentrations—it contributes to the foul odor of human and animal waste—but at low concentrations it can be combined with other ingredients to make more pleasant aromas. The same molecule that makes you want to stay away from the outhouse can help your laundry smell fresh.

How much skatol is in Minnesota drinking water?

Skatol has not been found in drinking water in Minnesota.

Has skatol been found in other waters in Minnesota?

The United States Geological Survey (USGS) found skatol in Minnesota wastewater and surface water at maximum concentrations of 27 parts per billion (ppb).[1] Skatol was found in about 14 percent of all water samples in this study. The Minnesota Pollution Control Agency (MPCA) also found skatol at very low levels in groundwater.[2] Very few studies have measured skatol concentrations in drinking water, surface water, groundwater or wastewater.

What is the MDH guidance value for skatol in drinking water?

MDH reviewed available information about skatol in 2011. MDH did not develop a guidance value for skatol because there is not enough information about potential health effects. If more information becomes available, MDH may consider further review of skatol.

What health information was found when MDH reviewed skatol?

There is some evidence from animal studies that skatol harms the lungs when inhaled at very high doses.

At a Glance

Skatol is…

- Found in human and animal waste.
- Produced naturally in the human body.
- Used in small amounts in fragrances and as an artificial food flavor.

Skatol enters your body from…

- Using fragrances containing skatol.
- Eating foods containing skatol.

Your exposure to skatol can be reduced by….

MDH does not have any recommendations for individual action at this time.

MDH did not develop health based guidance for skatol because…

There is currently not enough information about the health effects from skatol in drinking water.

Can skatol in drinking water affect my health?

There is not currently enough data about the potential for health effects from skatol in drinking water or the amount of skatol in drinking water to determine whether or not skatol in drinking water can affect health. However, MDH does not anticipate at this time that skatol in drinking water is of concern.

How does skatol get into my body?

Skatol is produced inside your body through natural digestive processes. Skatol also gets into your body from using scented products or eating foods that contain skatol.

How does skatol get into the environment?

Skatol naturally occurs in feces of humans and some animals, including some farm animals. When it rains, skatol in animal feces may be washed into lakes, rivers, streams, and possibly groundwater. Skatol in human waste may enter the environment through wastewater. It also gets washed down the drain and mixed with wastewater when we use products that contain skatol. Skatol may also be released into the environment when it is manufactured for use as a fragrance or food additive.

How long does skatol stay in the environment?

Once skatol is in soil, it tends to stay attached to soil. Some skatol may move through soil into groundwater. Skatol in surface water is likely to attach to particles in surface water, although some will go into the air.

The Contaminants of Emerging Concern (CEC) Program…

Evaluates health risks from contaminants in drinking water.

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More information on pharmecticuals and personal care products in water is available from the US Environmental Protection Agency (EPA): http://water.epa.gov/scitech/swguidance/ppcp/index.cfm

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Sulfonamide Antibiotics and Drinking Water

Sulfamethoxazole (SMX) and sulfamethazine (SMZ), two sulfonamide antibiotics, are contaminants that have been found in surface water and groundwater in Minnesota. The Minnesota Department of Health (MDH) developed health-based guidance values for SMX and SMX in drinking water and, based on these values, does not expect levels in drinking water to harm Minnesotans.

What are SMX and SMZ?

SMX and SMZ are sulfonamide antibiotic drugs. SMX is used for both human and veterinary applications, and SMZ is used for veterinary purposes only. Prescription rates of SMX for human applications have increased in the last decade.

People are primarily exposed to SMX is through taking it as a prescription medication. Because of the use of SMX and SMZ in animal agriculture, they have the potential to be found in food. The U.S. Department of Agriculture regularly monitors for drug residues in meat, poultry, and eggs, and has occasionally detected SMX and SMZ in these products (detected in about one in every ten thousand samples.) Even at the levels found, they are not expected to impact your health.

Have SMX and SMZ been found in Minnesota waters?

SMX has been found in rivers and lakes in Minnesota,[1,2] and is more likely to be found in those waters that receive treated wastewater. It has been found once in groundwater, in an urban monitoring well. To date, SMX has not been detected in finished drinking water in Minnesota.[2]

In a 2013 study by the Minnesota Pollution Control Agency, SMZ was detected at low levels in two out of 50 lakes tested.[1] SMZ has only been detected once in Minnesota groundwater, in a monitoring well near a feedlot. In a national reconnaissance study of rivers and streams, SMZ was detected in about 5 percent of samples. To date, SMZ has not been detected in finished drinking water in Minnesota.[2]

What are the MDH guidance values for SMX and SMZ in drinking water?

Based on available information, MDH derived a guidance value of 100 ppb for both SMX and SMZ in drinking water.[3] A person drinking water at or below this level, whether briefly, occasionally, or daily for a lifetime, would have little or no risk of any health effects from SMX and SMZ.

At a Glance

SMX and SMZ …

- are antibiotics used to fight infections in humans and other animals.
- have been found in water and food at low levels that are not expected to impact health.

SMX and SMZ enter your body…

- primarily from taking SMX as a prescription medication, and
- possibly (but rarely) from drinking contaminated water or eating contaminated animal products.

SMX and SMZ in drinking water are safe if…

Levels are lower than the MDH guidance value of 100 ppb.

Can SMX and SMZ in drinking water affect my health?

In toxicological studies, SMX and SMZ were shown to alter thyroid hormone levels and cause hyperplasia in the thyroid gland. However, levels of SMX and SMZ found in drinking water are not high enough to affect health. Use of antibiotics like these may contribute to the development of bacteria that are resistant to antibiotics. Over time, this could cause antibiotics to become less effective in treating infections in humans and other animals.

How do SMX and SMZ get into the environment?

These antibiotics get into the environment when they pass through the bodies of the animals or people who are taking them. They can also be released to the environment when animal manure or wastewater sludge containing traces of SMX and SMZ are land applied. Wastewater treatment removes some SMX and SMZ, but some passes through and is released to the environment. Unused prescription SMX and SMZ may also be disposed of improperly (e.g., flushing down the drain or toilet).

How long do SMX and SMZ stay in the environment?

SMZ biodegrades easily in sludge but does not break down easily in soil or groundwater. SMX is not easily biodegradable. In surface water, SMX may break down over a period of weeks when exposed to sunlight. However, SMX in surface water may be continuously replenished by additions of new treated wastewater.

What are the potential environmental impacts of SMX and SMZ?

Based on available laboratory studies, it appears unlikely that SMX or SMZ will cause widespread impacts to fish or other wildlife living in Minnesota lakes and streams. Limited studies show that SMX may interfere with normal reproduction and endocrine system function in fish. However, these studies were done with higher levels of SMX than have been found in Minnesota waters. Additional studies would be needed to determine the importance of these effects.

What Minnesotans Need to Know . . .

SMX and SMZ are antibiotic drugs used for human and veterinary applications. Levels found in water and food are not expected to impact health.

The Contaminants of Emerging Concern (CEC) Program…

Evaluates health risks from contaminants in drinking water and develops drinking water guidance. MDH works in collaboration with the Minnesota Pollution Control Agency and the Minnesota Department of Agriculture to understand the occurrence and environmental effects of contaminants.

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Triclocarban and Drinking Water

Triclocarban is a contaminant that has been found in waters that could be used as drinking water sources in Minnesota. The Minnesota Department of Health (MDH) developed a health-based guidance value for triclocarban in drinking water and, based on this value, does not expect levels of triclocarban in drinking water to harm Minnesotans.

What is triclocarban?

Triclocarban is a chemical used as a disinfectant and antibacterial agent in deodorant soaps and body washes, and as a preservative in some personal care products. In the U.S., it is primarily found in antibacterial deodorant bar soaps at concentrations up to 1.5 percent.

Has triclocarban been found in Minnesota waters?

Triclocarban has the potential to be in rivers and streams that receive treated wastewater. In Minnesota, it has been found in treated wastewater at levels up to 0.4 parts per billion (ppb) and in rivers and streams at up to 0.37 ppb.[1] The highest levels are found just downstream of wastewater treatment plants. These concentrations are below MDH guidance values.

What is the MDH guidance value for triclocarban in drinking water?

Based on the available information, MDH derived a risk assessment advice value of 100 ppb for triclocarban in drinking water.[2] A person drinking water at or below this level daily for a lifetime would have little or no risk of any health effects from triclocarban.

Can triclocarban in drinking water affect my health?

There is not a lot of information available on triclocarban in drinking water. Triclocarban is not likely to be present in municipal drinking water because it is removed during treatment. It is not common in groundwater because it tends to adhere to soil and sediment.

Limited studies on the health effects of triclocarban have been conducted in laboratory animals. Exposure to high doses of triclocarban caused toxicity in the blood system, liver, kidney and testes. Some studies suggest that triclocarban may have endocrine effects but additional studies are needed before conclusions can be made.

At a Glance

Triclocarban is…

- an “antimicrobial” that is commonly used in deodorant soaps to give them bacteria-fighting qualities.

Triclocarban enters your body from…

- using “anti-bacterial” deodorant soaps that contain triclocarban.

Your exposure to triclocarban can be reduced by….

- checking labels and avoiding products that contain triclocarban.

Triclocarban in drinking water is safe if…

The level is lower than the MDH guidance value of 100 ppb.

How does triclocarban get into the environment?

Triclocarban enters the environment mostly through municipal wastewater. Personal care products containing triclocarban are washed down drains into the wastewater system. Wastewater treatment systems are able to remove most triclocarban before it is released to rivers and streams, but a small amount (about 6 percent) is not removed during treatment.

How long does triclocarban stay in the environment?

Most of the triclocarban that passes through a wastewater treatment plant will be captured in sludge, where it will biodegrade. A small amount may reach surface water, where conditions may allow it to last for weeks or months. Even though it may biodegrade in the environment, triclocarban is also constantly released to surface waters through wastewater.

What are the potential environmental impacts of triclocarban?

Triclocarban is highly toxic to fish and other animals that live in water. Limited data suggests that the levels of triclocarban being found in the environment could negatively impact reproduction of these animals. Triclocarban may bioaccumulate in animals and plants that live in water.[3, 4]

What Minnesotans Need to Know . . .

Triclocarban is an ingredient in some deodorant soaps. It is found in surface water, but at concentrations below the MDH health-based guidance value for drinking water. However, triclocarban in surface water may negatively impact fish and other animals that live in water. For most people, the main route of exposure to triclocarban is through use of antibacterial deodorant bar soaps. If you use these products, triclocarban may be present in your body at very low levels. If you do not use these products, you are not likely to be exposed, because these products are the only significant route of exposure.

The Contaminants of Emerging Concern (CEC) Program…

Evaluates health risks from contaminants in drinking water.

References

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TDCPP and Drinking Water

Tris(1,3-dichloroisopropyl)phosphate (TDCPP) is a contaminant that has been found in waters that could be used as drinking water sources in Minnesota. The Minnesota Department of Health (MDH) developed a health-based guidance value for TDCPP in drinking water and, based on this value, does not expect levels of TDCPP in drinking water to harm Minnesotans.

What is TDCPP?

TDCPP is chemical that is added to materials to help reduce the spread of fire. TDCPP is added to polyurethane foams and plastics that are used to make many household products, including furniture, electronic devices and flame-resistant, machine-washable, and shrink resistant fabrics. TDCPP was used as a flame retardant for children's and infant's clothing until May 1977. Household items containing TDCPP cause TDCPP to be present in the indoor environment in dust. TDCPP has also been found in human tissue and breast milk at levels below health concerns.

Has TDCPP been found in Minnesota waters?

TDCPP has been detected at low levels in wastewater influent and effluent in Minnesota. TDCPP was present at levels below 0.4 parts per billion (ppb) in seven of 40 wells studied by the Minnesota Pollution Control Agency (MPCA), including one shallow, domestic drinking water well.[1] TDCPP was not found above 0.5 ppb in a United States Geological Survy (USGS) study of municipal water supplies.[2]

What is the MDH drinking water guidance value for TDCPP?

Based on available information, MDH derived a guidance value of 0.8 ppb for TDCPP in drinking water.[3] A person drinking water at or below this level, whether briefly, occasionally, or daily for a lifetime, would have little or no risk of any health effects from TDCPP.

Can TDCPP in drinking water affect my health?

Limited studies have been done on the noncancer health effects of TDCPP. Studies indicate that the kidney and male reproductive organs appear to be sensitive targets for TDCPP toxicity. Studies using human cells indicate that TDCPP may disrupt normal endocrine function and neurological development. Studies indicate that TDCPP is genotoxic. Long-term exposure studies in laboratory animals resulted in increased incidence of kidney, testicular and liver tumors. TDCPP has recently been added to California's Proposition 65 list as a carcinogen.

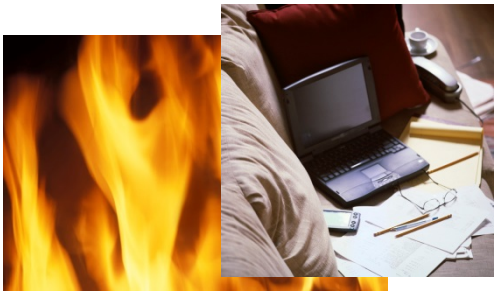
At a Glance

TDCPP is…

- a fire retardant used in household consumer products like plastics, foams, textiles, and electronics.

TDCPP enters your body primarily from…

- breathing contaminated indoor air and
- ingesting contaminated dust.



Your exposure to TDCPP can be reduced by….

- minimizing the purchase/use of TDCPP-containing products,
- vacuuming with a HEPA filter,
- wet dusting surfaces and floors, and
- hand washing.

TDCPP in drinking water is safe if…

The level is lower than the MDH guidance value of 0.8 ppb.

In March 2013, EPA completed a preliminary assessment of the potential health risks from flame retardants. TDCPP was included in a subgroup of flame retardants known as chlorinated phosphate ester flame retardants. Based on this assessment, tris(2-chloroethyl)phosphate (TCEP) was selected for full risk assessment as a representative of that subgroup. The EPA assessment is in progress and results are not yet available. In 2011, MDH developed a drinking water health based guidance value for TCEP.[4]

How does TDCPP get into the environment?

As noted above, TDCPP enters the home environment from household products such as furniture and electronic devices and is often found at low levels in household dust. It may also be found in air in industrial settings. TDCPP can also be released to the wastewater stream by industrial facilities that use TDCPP in manufacturing, and also by household wastewater. Most treatment facilities can only remove a small amount of TDCPP from wastewater. Because of this, TDCPP can be found in surface water (primarily streams) at low concentrations (less than 0.5 ppb).[5] TDCPP can also enter groundwater through the leaching of fire-resistant foams and plastics in landfills.

How long does TDCPP stay in the environment?

TDCPP tends to stay in the environment and does not easily break down into other chemicals. It does not biodegrade under most conditions.

What are the potential environmental impacts of TDCPP?

Laboratory studies show that TDCPP harms fish and other animals that live in water. The harmful levels of TDCPP are much higher than levels that, as far as we know, are in our lakes and rivers. However, little is known about how often and how much TDCPP is in water across Minnesota. Studies of fish embryos exposed to TDCPP suggest that even very low levels may interfere with normal endocrine function. These low levels of TDCPP are not expected to harm humans. Compared to humans, fish and other animals are more likely to be harmed by TDCPP in lakes and rivers.

What Minnesotans Need to Know …

TDCPP is common in indoor and outdoor environments. It is sometimes found in groundwater, but at concentrations below the MDH guidance value. For most people, the main route of exposure to TDCPP is through contact with household dust.

The Contaminants of Emerging Concern (CEC) Program…

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