Drinking Water Contaminants of Emerging Concern Program

A Minnesota Clean Water Fund Initiative

Biennial Report: Fiscal Years 2010-2011

Minnesota Department of Health

September 2011

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

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CLEAN WATER LAND & LEGACY AMENDMENT

Drinking Water Contaminants of Emerging Concern Program

A Minnesota Clean Water Fund Initiative

Biennial Report: Fiscal Years 2010-2011

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

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CWF Background

The constitutional amendment approved by Minnesota voters in November 2008 dedicated sales tax revenue to the Clean Water Fund (CWF) to protect, enhance, and restore water quality in lakes, rivers, streams, and groundwater. A minimum of five percent of the fund is targeted to protect drinking water. A portion of this five percent was allocated to the Minnesota Department of Health (MDH). This funding made it possible for MDH to establish the Drinking Water Contaminants of Emerging Concern (CEC) program. The CEC program takes a proactive approach to the protection of drinking water through research and assessment of potential health risks associated with contaminants of emerging concern.

About the Program

Contaminants of emerging concern are substances that have been released to, found in, or have the potential to enter Minnesota waters (surface water and groundwater), and:

- pose a real or perceived health threat,
- do not have Minnesota human health-based guidance, or
- have new or changing health or exposure information.

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,
- investigate potential sources, impacts, exposures and health risks of CECs in drinking water,
- determine how much of a contaminant is safe to drink, and
- inform partners and the public.

Assessment Process

Toxicity and exposure criteria were developed to facilitate systematic, consistent, and efficient evaluation of nominated chemicals. The criteria were brought to a Contaminant Screening Criteria and Prioritization Development Task Group (Criteria Task Group) for review and comment.

Contaminants

MDH staff selected chemicals for review under the CEC program, in consultation with other state and federal agencies. Selection was based on several factors, including exposure potential, new toxicity/use information, detection in Minnesota waters, and available biomonitoring data. CEC chemicals assessed in future biennia will be nominated through a stakeholder process. The ten contaminants reviewed in the 2010-11 biennium are: acetaminophen; 6-acetyl-1,1,2,4,4,7-hexamethyltetraline (AHTN or Tonalide); carbamazepine; N,N-diethyl-meta-toluamide (DEET); 1,4-dioxane; three metribuzin degradates; pyraclostrobin; tris(2-chloroethyl) phosphate (TCEP); 1,2,3-trichloropropane (1,2,3-TCP); and triclosan. MDH staff have prepared environmental exposure summaries and health-based guidance values for these chemicals consistent with current MDH risk assessment methodology.

Screening assessments were completed for an additional thirteen nominated chemicals, including the nine chemicals identified on the Toxic Free Kids Act Priority Chemicals[1] list; bisphenol A (BPA), butyl benzyl phthalate (BBP), cadmium, decabromodiphenyl ether (decaBDE), dibutyl phthalate (DBP), di(2-ethylhexyl)phthalate (DEHP), formaldehyde, hexabromocyclododecane (HBCD), lead, propyl paraben, skatol, sulfamethoxazole, and triclocarban.

Additionally, seven chemicals were nominated and selected for screening in this biennium; 17 alpha-ethinylestradiol, mycrocystin, nonylphenol, nonylphenol mono-ethoxylate (NP1EO), nonylphenol di-ethoxylate (NP2EO), octylphenol, and trimethoprim. Screening assessments for these chemicals may be completed in the FY2012-2013 biennium.

Advice and Consultation

The work of the program is facilitated by collaborative relationships with other state and federal agencies, academic and industry researchers, and nonprofit groups. MDH has convened an Advisory Forum that includes the

[1] www.health.state.mn.us/divs/eh/hazardous/topics/toxfreekids/priority.html

partners noted above, as well as other stakeholders and the public. Additionally, task groups will be convened as needed to address specific charge questions. Forum members and other persons with expertise relevant to the task group charge will be invited to participate. MDH convened two task groups during the first biennium, the Criteria Task Group and the Communication, Education, and Outreach Task Group (Communication Task Group).

Communications

There is 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.

Research and Special Projects

Using contracts, MDH has the opportunity to initiate research that supports the evaluation of contaminants of emerging concern in drinking water. In the first biennium of the program, four projects were initiated. The first, Evaluating, Testing, and Reporting of Alternative Risk Assessment Methods (Alternative Risk Assessment) project, is a two year research initiative that will include identifying, describing, and testing alternative methods for assessing risks from contaminants of emerging concern when limited toxicity information is available. The second, Relative Source Contribution project, is the first phase of a research project to evaluate models for quantifying exposures from sources other than ingesting drinking water. The third, Baseline Needs Assessment project, included conducting focus groups around the state to determine how Minnesotans become aware of drinking water contaminant concerns, where they go for information, and what kind of information they seek. The final project, Analytical Methodology Development, included testing a limited number of groundwater samples for 1,2,3-TCP using a suitably low detection limit.

Program Highlights

In the 2010-2011 biennium, CEC program staff have:

- developed health-based guidance and exposure assessments for ten contaminants (acetaminophen, AHTN, carbamazepine, DEET, 1,4-dioxane, metribuzin degradates, pyraclostrobin, TCEP, 1,2,3-TCP, and triclosan),
- completed preliminary screening assessments on thirteen chemicals (BPA, BBP, cadmium, decaBDE, DBP, DEHP, formaldehyde, HBCD, lead, propyl paraben, skatol, sulfamethoxazole, and triclocarban),
- selected seven chemicals for future screening (17 alpha-ethinylestradiol, mycrocystin, nonylphenol, nonylphenol mono-ethoxylate, nonylphenol di-ethoxylate, octylphenol, and trimethoprim),
- engaged stakeholders,
- presented on the program more than 14 times at technical conferences and to interested agencies and organizations,
- convened two task groups and an advisory forum,
- initiated a public chemical nomination process,
- developed criteria for selecting and screening nominated contaminants for review,
- initiated a two year research project, and
- initiated and completed three additional research projects.

Future Activities

MDH received funds to continue this work into the 2012-2013 biennium. The CEC program will continue to address ongoing challenges and continue to provide valuable information regarding the health impacts and exposure potential of contaminants of emerging concern. Ongoing updates will be provided via the program website, quarterly reports, and our email subscription service.

Additionally, the program will continue to expand outreach efforts and will continue to provide consultation and technical support to state monitoring and enforcement programs that address exposure concerns raised by these new health risk assessments.

CWF Background

On Election Day 2008, the voters of Minnesota approved an amendment (the Clean Water, Land, and Legacy Amendment[2]) to the state Constitution, increasing sales tax by three-eighths of one percent. The sales tax revenue is allocated to the following four funds: Arts and Cultural Heritage, Clean Water, Outdoor Heritage, and Parks and Trails.

One-third of the sales tax revenue is dedicated to the Clean Water Fund (CWF) to protect and maintain Minnesota's surface water and groundwater resources. Although a minimum of five percent of the CWF must be spent to protect drinking water, appropriations for drinking water protection actually exceeded five percent during the first biennium. The use of this fund is determined by the Minnesota Legislature (Minnesota Session Laws, Chapter 172, Article 2, Section 7[3]). The funding bill allocated monies from the CWF to state and regional agency programs and the University of Minnesota, as shown below.

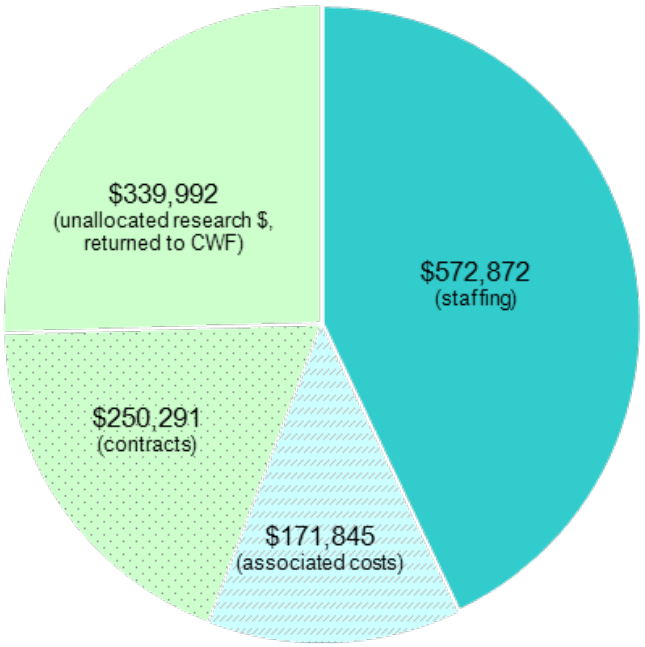
Interagency Coordination

The agencies and organizations that received CWF monies include the Minnesota Department of Natural Resources (DNR), the Minnesota Pollution Control Agency (MPCA), the Minnesota Board of Water and Soil Resources (BWSR), the Minnesota Department of Agriculture (MDA), the Minnesota Department of Health (MDH), the Minnesota Public Facilities Authority (PFA), the Metropolitan Council, and the University of Minnesota. Ongoing coordination among these agencies and organizations helps to achieve CWF outcomes and to provide consistent CWF information for public use, reporting, and administrative procedures.

Clean Water Fund Appropriations

MDH was allocated a total of $3,750,000 for the 2010-2011 biennium. MDH's Source Water Protection (SWP) program received $2,415,000 to increase the number of public water suppliers that develop and implement source water protection plans. A portion of this was provided via grants to public water suppliers for implementation projects.

MDH's Health Risk Assessment (HRA) unit received $1,335,000 to address potential health risks related to contaminants of emerging concern and established the Drinking Water Contaminants of Emerging Concern (CEC) program. Dollars spent in the first biennium of the CEC program are shown in the graph below.



[2] www.house.leg.state.mn.us/cco/rules/mncon/Article11.htm

[3] www.revisor.mn.gov/laws/?id=172&year=2009&type=0

Approximately half of these monies were intended for contracted research. However, the program was unable to initiate as many contracts as intended due to an initial startup delay in acquiring allocated funds and hiring new, dedicated staff. The unspent dollars ($339,992) were returned to the CWF. The allocation for the CEC program represents less than one percent of total CWF dollars and less than ten percent of the CWF dollars dedicated to drinking water protection.

About the Program

The CEC program mission is to investigate and communicate the health and exposure potential of contaminants of emerging concern in drinking water.

Contaminants of emerging concern are substances that have been released to, found in, or have the potential to enter Minnesota waters (surface water and groundwater), and:

- pose a real or perceived 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.

CECs challenge us to look at how contaminants get into the environment. CECs come not only from industrial sources, but also from our everyday use of common products.

These contaminants are being found 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.

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,
- 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.

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 currently develops human health-based guidance for contaminants that have already been found in groundwater in Minnesota and provides advice to risk assessors and other interested parties through Health-Based Rules and Guidance for Groundwater[4]. MDH develops three types of health-based guidance:

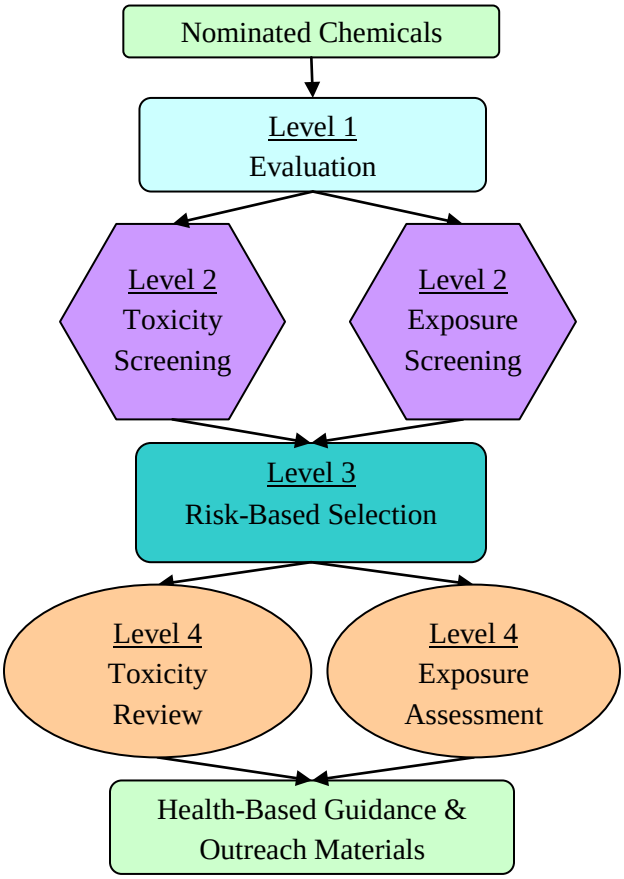
- Health Based Values (HBVs) - guidance values based on substantial scientific information,
- Health Risk Limits (HRLs) - HBVs that have been made into rules for groundwater contaminants, and
- Risk Assessment Advice (RAA) - either guidance values or other advice, based on limited scientific information.

The work of developing health-based guidance for contaminants found in groundwater will continue. Funding for the CEC program will expand these activities to address contaminants in both surface and groundwater and to provide exposure assessments that evaluate use, occurrence, and potential for exposure.

Assessment Process

The process of going from a nominated chemical to publication of health-based guidance currently includes four levels of assessment (shown below): (Level 1) Evaluation, (Level 2) Toxicity and Exposure Screening, (Level 3) Risk-Based Selection, and (Level 4) Guidance & Outreach Development.

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



Levels of Assessment

A list of nominated chemicals is the starting point for evaluation and may include any chemical nominated by individuals, groups, agencies, and organizations. Nominated chemicals are first evaluated under the Level 1 Assessment to determine if they meet the definition of a contaminant of emerging concern.

Chemicals that meet the definition of a contaminant of emerging concern are screened under the Level 2 Assessment to determine the need for, and the feasibility of, developing health-based guidance. Health and exposure screening processes for the Level 2 Assessment were developed by MDH staff and were brought to the Contaminant Screening Criteria and Prioritization Development Task Group (Criteria Task Group for review and revision (refer to the Advice and Consultation section of this report). During screening, staff assemble information related to exposure and toxicity potential. Staff look for exposure information on: 1) monitoring data (e.g., has the chemical been found in Minnesota surface water or groundwater?); 2) potential for release to the environment (e.g., how much of the chemical is used and what is it used for?); and 3) how the chemical behaves in the environment (e.g., how easily does it dissolve in water, how long does it persist in the environment?). Staff look for toxicity information on: 1) potency (e.g., at what dose level are health effects observed); 2) severity of the observed health effects; 3) evidence that the chemical exhibits endocrine or genotoxic activity; and 4) sensitive sub-populations (e.g., developmental concerns, allergies).

Chemicals that successfully pass through this screening process are then ranked and selected (Level 3 Assessment) for further work, using a risk-based approach. The methodology for the Level 3 Assessment was discussed in depth with the Criteria Task Group and may continue to evolve as more chemicals are nominated and screened.

Health-based guidance are then developed for the selected chemicals under the Level 4 Assessment using MDH's established methodology for guidance development. The Level 4 Assessment includes a preliminary review of available toxicity information conducted by a designated MDH toxicologist, a secondary review conducted by a different MDH toxicologist, and concludes with review by the full MDH toxicology team. A similar approach is used to conduct an exposure assessment. Health-based guidance is posted on the program's Chemical Reviews[5] web page when reviews are complete. Additionally, MDH staff prepare outreach materials that provide exposure and health information (refer to the Communications section of this report).

Contaminants

Contaminant Selection

In order to meet program deadlines, MDH staff selected contaminants for review in the first biennium. This was done through consultation with MDH staff and staff from other state and federal agencies, review of existing contaminant of concern lists developed by

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

other agencies and organizations, and development of a working definition of, and criteria for, selecting contaminants of emerging concern. Criteria included:

- potential for human exposure,
- representation of a variety of chemical use categories (e.g., pharmaceuticals, agricultural, personal care products, etc.),
- availability of new health or use information,
- availability of biomonitoring information, and
- detection in Minnesota source water based on United States Geological Survey (USGS), MPCA, and American Water Works Association (AWWA) monitoring data.

Contaminant Nomination

Soliciting contaminant nominations from a broader stakeholder group and the public is a vital component of this program. In order to solicit contaminant nominations from stakeholders and the public, a Nominations[6] web page was added to the CEC program website. This web page accepts nominations year round and allows anyone to nominate chemicals. A table for tracking nominated chemicals is updated on a quarterly basis and is included as an attachment to quarterly reports. The final tracking table for this biennium is located in Attachment A. The tracking table lists nominated chemicals and summarizes program activity related to that chemical, including their status in the program (in screening, guidance completed, not selected for review, etc.).

In addition to the Nominations web page, MDH staff actively solicit contaminant nominations from the Advisory Forum, task groups, and other stakeholders as applicable (refer to the Advice and Consultation section of this report).

Chemicals Reviewed

The ten contaminants reviewed in the 2010-11 biennium are shown in the table below and briefly described subsequently (refer to the program web page for additional chemical specific information). The guidance values provided in the table indicate the concentration of the chemical, in parts per billion (ppb) that can be consumed via drinking water for a given duration with little to no health risk.

Reviewed Chemicals Table

Chemical Name	MDH Guidance Value(s)
Acetaminophen	200 ppb – exposure up to a lifetime
6-Acetyl-1,1,2,4,4,7-hexamethyltetraline (AHTN or Tonalide)	200 ppb – exposure up to 30 days 40 ppb – exposure up to 8 years 20 ppb- exposure up to a lifetime
Carbamazepine	40 ppb- exposure up to a lifetime
N,N-Diethyl-meta-toluamide (DEET)	200 ppb – exposure up to a lifetime
1,4-Dioxane	300 ppb - exposure up to 8 years 100 ppb - exposure up to a lifetime 1 ppb- exposure up to a lifetime to protect from cancer
Metribuzin degradates (DA, DK, DADK)	40 ppb – exposure up to a day 10 ppb – exposure up to a lifetime
Pyraclostrobin	300 ppb – exposures up to a day 100 ppb – exposure up to a lifetime
Tris(2-Chloroethyl) phosphate (TCEP)	300 ppb- exposure up to 30 days 200 ppb – exposure up to a lifetime 5 ppb – exposure up to a lifetime to protect against cancer
1,2,3-Trichloropropane (1,2,3-TCP)	20 ppb – exposure up to 1 day 10 ppb – exposure up to a lifetime 0.003 ppb exposure up to a lifetime to protect from cancer
Triclosan	200 ppb – exposure up to a day 50 ppb – exposure up to a lifetime

Acetaminophen[7]

Acetaminophen is a medication widely used to reduce fever and pain. Additionally:

- It has been found in Minnesota waters at concentrations below the lowest MDH guidance value (200 ppb).
- Based on limited drinking water monitoring in Minnesota, acetaminophen has been found only once in untreated drinking water at a concentration of 0.010 ppb (about 20,000 times less than 200 ppb).

[6] www.health.state.mn.us/divs/eh/risk/guidance/dwec/nominate.cfm

[7] www.health.state.mn.us/divs/eh/risk/guidance/dwec/acetaminglance.html

6-Acetyl-1,1,2,4,4,7-hexamethyltetraline (AHTN)[8]

AHTN is a musky fragrance used in personal care and cleaning products. Additionally:

- It has been found in Minnesota waters at concentrations below the lowest MDH guidance value (20 ppb).
- Based on limited drinking water monitoring in Minnesota, AHTN was found only once in treated drinking water at a concentration of 0.065 ppb (about 300 times less than 20 ppb).

Carbamazepine[9]

Carbamazepine is a medication used mainly to help control seizures. Additionally:

- It has been found in Minnesota surface water at concentrations below the lowest MDH guidance value (40 ppb).
- Based on limited drinking water monitoring in Minnesota, carbamazepine has not been found in drinking water or groundwater.

N,N-Diethyl-meta-toluamide (DEET)[10]

DEET is added to insect repellents to repel mosquitos and ticks. Additionally:

- It has been found in Minnesota waters below the lowest MDH guidance value (200 ppb).
- Based on limited drinking water monitoring in Minnesota, DEET was found in treated drinking water at a concentration of 0.061 ppb (about 3,000 times less than 200 ppb).

1,4-Dioxane[11]

1,4-Dioxane is a contaminant of personal care and cleaning products, and is a stabilizer for chlorinated solvents. Additionally:

- It has been found in Minnesota waters at concentrations above the lowest MDH guidance value (1 ppb).
- Groundwater samples from a site in Minneapolis with known 1,4-dioxane contamination had concentrations as high as 74 ppb. This exceeds MDH guidance but is higher than concentrations that would be expected to be found in drinking water.

Metribuzin Degradates[12]

Metribuzin is an herbicide used to control weeds in potato, corn, and soybean production. Once in the environment, it may break down into degradates named deaminated metribuzin (DA), diketometribuzin (DK), and deaminated diketometribuzin (DADK). Additionally:

- Metribuzin and its degradates have been found in Minnesota waters below the lowest MDH risk assessment advice value (10 ppb).
- Metribuzin degradates were found at a maximum concentration of 9.28 ppb in shallow monitoring wells in areas of Minnesota considered vulnerable to contamination. This is higher than concentrations that would be expected to be found in drinking water.

Pyraclostrobin[13]

Pyraclostrobin is pesticide used to prevent the growth of fungi on a wide range of crops. Additionally:

- It was not found in surface water or groundwater in Minnesota during a recent study conducted by MDA.
- The lowest MDH guidance value is 100 ppb.

Tris(2-Chloroethyl)phosphate (TCEP)[14]

TCEP is a flame/fire retardant added to plastics, foams, and textiles. Additionally:

[8] www.health.state.mn.us/divs/eh/risk/guidance/dwec/ahtnglance.html

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

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

[11] www.health.state.mn.us/divs/eh/risk/guidance/dwec/14dioxaneglance.html

[12] www.health.state.mn.us/divs/eh/risk/guidance/dwec/summetribuzin.pdf

[13] www.health.state.mn.us/divs/eh/risk/guidance/dwec/pyraclosataglance.html

[14] www.health.state.mn.us/divs/eh/risk/guidance/dwec/tcepglance.html

- It has been found in Minnesota waters at concentrations below the lowest MDH guidance value (5 ppb).
- Based on limited drinking water monitoring in Minnesota, TCEP was found in treated drinking water at concentrations of about 0.066 ppb (about 80 times less than 5 ppb).

1,2,3-Trichloropropane (1,2,3-TCP)[15]

1,2,3-TCP is a contaminant of pesticides once used in Minnesota and is also used to make other chemicals. Additionally:

- It has been found in Minnesota waters at concentrations above the lowest MDH guidance value (0.003 ppb) at one closed landfill site at a concentration of 4.3 ppb.
- Because the new MDH guidance is lower than previous guidance, the detection limits used in prior monitoring are no longer considered adequate (refer to the Research and Special Projects section of this report).

Triclosan[16]

Triclosan is an antimicrobial agent that is added to soaps, cleaners and other products. Additionally:

- It has been found in Minnesota waters at concentrations below the lowest MDH guidance value (50 ppb).
- Based on limited drinking water monitoring in Minnesota, triclosan has not been found in drinking water or groundwater.

Other Chemicals

Screening assessments were completed for an additional thirteen nominated chemicals, including the nine chemicals identified on the Toxic Free Kids Act Priority Chemicals[17] list; bisphenol A (BPA), butyl benzyl phthalate (BBP), cadmium, decabromodiphenyl ether (decaBDE), dibutyl phthalate (DBP), di(2-ethylhexyl)phthalate (DEHP), formaldehyde, hexabromocyclododecane (HBCD), lead, propyl paraben, skatol, sulfamethoxazole, and triclocarban.

Additionally, seven chemicals were nominated and selected for screening in this biennium; 17 alpha-ethinylestradiol, mycrocystin, nonylphenol, nonylphenol mono-ethoxylate (NP1EO), nonylphenol di-ethoxylate (NP2EO), octylphenol, and trimethoprim. Screening assessments for these chemicals may be completed in the FY2012-2013 biennium.

Chemicals that were nominated but not selected for screening are listed in the tracking table (refer to Attachment A).

Advice and Consultation

Preliminary Outreach

At the beginning of this biennium, CEC program staff conducted preliminary outreach with representatives from state and federal agencies, including staff from the MPCA, MDA, USGS, and internally with staff from SWP and MDH's Public Health Lab (PHL). Additionally, MDH staff met and/or spoke with researchers from the University of Minnesota, Saint Cloud State University and the University of Saint Thomas, representatives from nonprofit organizations (AWWA, Clean Water Action, Fresh Water Society, Institute for Agriculture and Trade Policy, Minnesota Center for Environmental Advocacy, and the League of Women Voters), as well as Minnesota industry representatives or consultants (Ecolab, Ridge Road Consulting, and the Minnesota Chamber of Commerce's Environment & Natural Resources Policy Committee). Many of the stakeholders engaged through these preliminary meetings continue to participate in the program through task groups and the Advisory Forum.

[15] www.health.state.mn.us/divs/eh/risk/guidance/dwec/123tcpglance.html

[16] www.health.state.mn.us/divs/eh/risk/guidance/dwec/triclosanglance.html

[17] www.health.state.mn.us/divs/eh/hazardous/topics/toxfreekids/priority.html

Advisory Forum

CEC staff convened an Advisory Forum[18] as part of the program's outreach efforts. The Advisory Forum is proposed 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 first forum meeting was held on January 21, 2011. Attendees included representatives from federal, state, and local government units, nonprofit organizations, academic institutions, industry, and the public. The forum included updates on the CEC program, including an update from the contractor completing the Evaluating, Testing, and Reporting of Alternative Risk Assessment Methods (Alternative Risk Assessment) project (see the Research and Special Projects section of this report). Additionally, the forum provided an opportunity for other agencies and organizations to provide updates on the work they are conducting related to contaminants of emerging concern. The MPCA presented their findings from a recent study and other agencies and organizations provided informal updates. Nominations received at the forum are included in the tracking table (Attachment A).

In addition to the forum, MDH will convene task groups to address specific charge questions. Task group participants may include both forum members and non-forum members with applicable expertise. Task groups convened to date are described below.

Criteria Task Group

The Criteria Task Group is comprised of representatives from state and federal agencies, industry and nonprofit groups, and academic institutions. This task group met five times over the course of eight months. This task group was convened to help MDH by:

- reviewing the draft chemical nomination and evaluation processes,
- reviewing the draft toxicity and exposure screening processes, and
- discussing methodologies for selecting screened nominated chemicals for guidance development.

Communication Task Group

The Communication, Education, and Outreach Task Group (Communication Task Group) is comprised of representatives from state and federal agencies, industry and nonprofit groups, and academic institutions. This task group has met twice and will meet a total of six times. This task group was convened to help MDH:

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

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.

MDH staff also participate in inter-agency CWF meetings and maintain contact with other CWF projects and programs. In addition to inter-agency coordination, CEC staff participate in intra-agency planning so that CEC activities are coordinated with other CWF-funded MDH programs and integrated into the ongoing work of the department.

Communications

There is 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.

[18] www.health.state.mn.us/divs/eh/risk/guidance/dwec/advisory.html

Program Website

The CEC program website[19] is updated with new program information on a regular basis. People 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 1,500 subscribers currently receive these email updates.

Quarterly Reports

Quarterly reports, delivered via the program website, provide summaries of quarterly activities as well as updated tracking tables (previously described in the Contaminant Nomination subsection of this report).

Presentations

MDH staff are actively involved in engaging stakeholders and conducting outreach, including presenting at technical conferences and to interested agencies and organizations. Presentations to the following audiences were conducted by MDH staff (this list does not include internal presentations to MDH staff or presentations to the Advisory Forum or task groups):

- Northland Society of Toxicology – May 6, 2010
- Healthy Legacy Coalition – May 26, 2010
- Chamber of Commerce – June 17, 2010
- Federal-State Toxicology Risk Analysis Committee – October 14, 2010
- MN Water Resources Conference – October 19, 2010
- Big Green Conference – November, 11, 2010
- Society for Risk Analysis – December 7, 2010
- MN Environmental Health Association – January 27, 2011
- US Environmental Protection Agency – February 2, 2011
- University of MN – February 14, 2011
- MN Rural Water Association – March 2, 2011
- University of MN – May 2, 2011
- Living Green Expo – May 8, 2011
- Environmental Initiative – June 29, 2011

Outreach Materials

Outreach materials that summarize exposure and health information are developed for all screened and reviewed chemicals. The CEC program strives to provide materials for everyone. Materials include At-A-Glance and Citizen's Guide webpages (refer to the Chemical Reviews[20] webpage for links to these pages). Additionally, a technical guide for environmental and health professionals is anticipated to be prepared for chemicals that have undergone full review.

Research and Special Projects

During the program's first year of evaluating potential chemical exposures to emerging contaminants via drinking water, several challenges emerged. Challenges include the ability to develop guidance for contaminants with very limited toxicity information, the ability to estimate exposures from non-water sources that contribute to exposure, and the sensitivity of analytical methodologies for some chemicals. Contracted research provides opportunity for MDH to address these challenges and to initiate research that supports the evaluation of contaminants of emerging concern in drinking water.

Alternative Risk Assessment Project

The first project that was initiated under the CEC program is the Alternative Risk Assessment project. The project is anticipated to be completed in approximately two years from the start date (September 2010).

The proposed project will include identifying, describing, and testing alternative methods for assessing risks from contaminants of emerging concern with limited available toxicity information. It is anticipated that the outcome of the project will be

[19] ww.health.state.mn.us/divs/eh/risk/guidance/dwec/index.html

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

alternative methods capable of generating health-protective guidance that is consistent with guidance developed using current methodology.

The results of this work will be evaluated by a peer review panel. Based on the outcome of the peer review panel, and at the discretion of MDH, a public seminar and technical training workshop will be held for Minnesota risk assessors, regulators, and the public.

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 factor (RSC) to account for the possibility of multiple exposure sources (food, water, air, consumer products) or routes of exposure (such as ingestion, inhalation, or dermal absorption). The RSC is used to allocate a portion of the total exposure to drinking water so that total exposure does not exceed a safe level.

MDH staff contracted the first phase of a research project to evaluate models for quantifying exposures from sources other than ingesting water. The results of this project will be used to assist MDH staff in determining RSC factors. This first phase resulted in the review, identification, and evaluation of existing models.

Baseline Needs Assessment

MDH prepares various outreach and education materials related to the activities and programs conducted by MDH. In order to maximize the effectiveness of these materials, MDH conducted focus groups around the state to determine how Minnesotans become aware of drinking water contaminant concerns, where they go for information, and what kind of information they seek.

Analytical Methodology Development

Because MDH's health-based guidance value for 1,2,3-TCP decreased from 40 ppb to 0.003 ppb, the detection limits currently used for analyzing water samples in Minnesota are not adequate to ensure that concentrations of 1,2,3-TCP are below the new guidance. MDH staff initiated a project to identify a more sensitive analytical methodology and collect a small number of samples for analysis. The MDH PHL investigated the feasibility of developing a more sensitive method in-house, but PHL staff found that an outside laboratory could achieve a lower detection limit than the PHL, given the other demands on the PHL's equipment and staff time. Staff from the PHL and CEC identified a private laboratory in California capable of attaining a reporting level of 0.0007 ppb. Staff from MDA and MDH collected groundwater samples from four agricultural monitoring wells, one closed landfill monitoring well, and eight noncommunity public wells. Samples were analyzed by the contract laboratory using a detection limit of 0.0007 ppb. The results of the monitoring indicate no detections of 1,2,3-TCP in the wells sampled.

Future Research Opportunities

CEC program staff are considering additional projects for future funding including a second phase to the relative source contribution research project, a grant for non-profit organizations to conduct outreach activities, and research related to cumulative impacts of chemical exposures.

Future Activities

MDH has received funds to continue the work of the program into the 2012-2013 biennium. The CEC program will continue to address ongoing challenges and continue to provide valuable information regarding the health impacts and exposure potential of contaminants of emerging concern. Ongoing updates will be provided via the program website, quarterly reports, and our email subscription service.

Additionally, the program will continue to expand outreach efforts and will continue to provide consultation and technical support to state monitoring and enforcement programs that address exposure concerns raised by these new health risk assessments.

Attachment A

Nominated Contaminants of Emerging Concern Tracking Table

Minnesota Department of Health (MDH) Nominated Contaminants of Emerging Concern (CEC) Tracking Table: 2010-2011 Biennial Report

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	Meets MDH Definition of CEC[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
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)	Acute - NA Short-term - 200 Subchronic - 40 Chronic - 20 Cancer - NA
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 team	US Environmental Protection Agency 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	Screening completed (April 2011). Remains on list for future consideration.	Chronic - 300 (1998 HBV). 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	Meets MDH Definition of CEC[2]?	Current MDH Status	MDH Health-based Guidance Value[3] (ug/L)
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	Screening completed (March 2011). Remains on list for future consideration.	Chronic – 100 (1993 HRL). Re-evaluation of value is warranted.
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 team	Chronic – 4 (1993 HRL), Re-evaluation of value is warranted.
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)	Acute - 40 Short-term - 40 Subchronic - 40 Chronic - 40 Cancer - NA
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.	--
DEET (N,N-Diethyl-meta-toluamide) [134-62-3]	MDH CEC Staff (May 2010)	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)	Acute - NA Short-term - 200 Subchronic - 200 Chronic - 200 Cancer - NA
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	Screening completed (March 2011). Remains on list for future consideration.	Chronic – 700 (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	Meets MDH Definition of CEC[2]?	Current MDH Status	MDH Health-based Guidance Value[3] (ug/L)
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	Screening completed (March 2011). Remains on list for future consideration.	Chronic – 6 (MCL HRL). Re-evaluation of value is warranted.
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)	Acute - NA Short-term - NA Subchronic - 300 Chronic - 100 Cancer - 1
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	Awaiting screening	- -
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	Selected for screening (July 2011)	- -
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	Awaiting screening	- -
Formaldehyde [50-00-0]	MDH staff (Toxic Free Kid Act priority chemical) (Feb 2011)	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.	Formaldehyde can irritate the respiratory tract, eyes, skin and gastrointestinal tract. Formaldehye has been classified as carcinogenic to humans by inhalation.	To Be Determined	Screening completed (March 2011). Remains on list for future consideration.	Chronic – 1000 (1994 HRL)

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	Meets MDH Definition of CEC[2]?	Current MDH Status	MDH Health-based Guidance Value[3] (ug/L)
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.	--
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), Internal discussion regarding need and feasibility of full assessment.	Additional information on US Environmental Protection Agency
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 team	--
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.	
Mycrocystin [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.	To Be Determined	Selected for screening (June 2011).	- -
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	Selected for screening (June 2011).	- -

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	Meets MDH Definition of CEC[2]?	Current MDH Status	MDH Health-based Guidance Value[3] (ug/L)
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	Selected for screening (June 2011).	- -
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	Selected for screening (June 2011).	- -
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	Selected for screening (June 2011).	- -
Propyl paraben [94-13-3]	MDH CEC Staff (May 2010)	Food additive; 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 a plant growth promoter. From 2003 to 2008 there was a 3-fold increase in sales in Minnesota. Aerial application raises concerns regarding impacts to surface water.	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.	--

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	Meets MDH Definition of CEC[2]?	Current MDH Status	MDH Health-based Guidance Value[3] (ug/L)
Sulfamethoxazole (Sulfamethoxazole) [723-46-6]	MDH CEC Staff (July 2010)	Antibiotic – poultry, fish, etc.	Has been detected in Minnesota and national monitoring studies (a,b,c,e)	Possible effects on thyroid hormones have been reported in animals and humans. Thyroid tumors have been reported in animal studies.	Yes	Screening completed (Dec 2010) No further review anticipated due to insufficient toxicity information.	--
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)	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	Screening completed (Dec 2010). Remains on list for future consideration.	- -
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
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	Selected for screening (July 2011)	- -
Tris(2-chloroethyl) phosphate (TCEP) [115-96-8]	MDH CEC Staff (May 2010)	Plasticizer, flame retardant	Has been detected in Minnesota and national monitoring studies (a,b,c,e)	May cause neurotoxicity and brain lesions, reduced fertility, and cancer (kidney tumors).	Yes	Full review completed (May 2011)	Acute - NA Short-term - 300 Subchronic - 200 Chronic - 200 Cancer - 5

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	Meets MDH Definition of CEC[2]?	Current MDH Status	MDH Health-based Guidance Value[3] (ug/L)
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	Awaiting screening	- -

[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 determine 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