Drinking Water Contaminants of Emerging Concern Program

A Minnesota Clean Water Fund Initiative

2010-2011 Biennium, Interim Report

Minnesota Department of Health

July 15, 2010

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Executive Summary

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 which has been 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, which takes a proactive approach to the protection of drinking water through research and assessment of the potential public health risks associated with contaminants of emerging concern.

About the Program

The CEC program objectives are to identify contaminants of emerging concern that have the potential to impact Minnesota drinking water, to investigate the potential for human exposure to these contaminants, and to develop guidance values. The CEC program will develop health-based guidance for ten contaminants during the current biennium (three in the first, and seven in the second fiscal year). Contaminants evaluated under the CEC program may include contaminants that have been released or detected in Minnesota waters (surface water and groundwater) or that have the potential to migrate to, or be detected in, Minnesota waters. Classes of chemicals that will be evaluated may include, but are not limited to: industrial chemicals, pesticides, pharmaceuticals, and personal care products.

Chemicals Under Review

MDH identified chemicals for review under the CEC program based on several factors, including exposure potential, new toxicity/use information, detection in Minnesota waters, and available biomonitoring data. Three chemicals were identified by MDH staff for assessment in fiscal year 2010 (FY10) to initiate the CEC program. CEC chemicals assessed in future biennia will be nominated through a stakeholder process. The FY10 chemicals are 1,2,3-tricholoropropane (1,2,3-TCP) (volatile organic compound), triclosan (antibacterial), and three metribuzin degradates (herbicide). MDH staff have prepared environmental exposure summaries and health-based values for these chemicals consistent with current MDH risk assessment methodology.

Criteria Development

Toxicity and exposure criteria are being developed to facilitate systematic, consistent, and efficient evaluation of chemicals nominated by stakeholders. The criteria will be brought to a Criteria Task Group (discussed under Communication and Outreach) for review. The Criteria Task Group will assist MDH in developing a process for evaluating whether health-based guidance can be developed for a nominated chemical.

Communication and Outreach

The work of the program will be facilitated by collaborative relationships with other state and federal agencies, academic and industry researchers, and nonprofit groups. MDH staff have conducted small group meetings and conference calls with partners from various state and federal agencies, academic institutions, and nonprofit and industry stakeholder groups. MDH is planning semi-annual meetings of an advisory forum that includes the partners noted above, as well as other stakeholders and the public. Additionally, task groups will be convened to address specific charge questions. Forum members and other persons with expertise relevant to the charge of a task group will be invited to participate.

Research and Special Projects

Approximately half of the monies allocated to the CEC program will be used to contract research on the risks, toxicity, or occurrence of contaminants. MDH staff are in the process of initiating a contract for a project to identify, evaluate, and test alternative risk assessment methodologies for developing health-based guidance for contaminants of emerging concern in drinking water. The project will assist MDH in developing health-based guidance when lack of toxicological data limits the use of MDH's current risk assessment methodology. The project will expand the risk assessment tools available to MDH.

Background

On Election Day 2008, the voters of Minnesota approved an amendment (the Clean Water, Land, and Legacy Amendment[1]) to the state Constitution, increasing the sales tax by 0.375 percent (three-eighths of one percent). The revenue generated by the sales tax increase is allocated to protect water quality, preserve arts and culture, and support state parks and trails through the following five funds: Arts and Cultural Heritage, Clean Water, Environment and Natural Resources, Outdoor Heritage, and Parks and Trails.

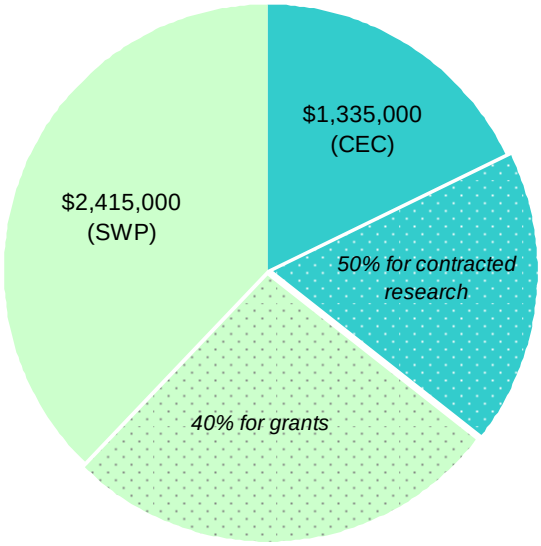
One-third of the revenue generated by the sales tax increase is dedicated to the Clean Water Fund (CWF) to protect and maintain the quality of Minnesota's surface water and groundwater resources. Although a minimum of five percent of the fund is targeted to protect drinking water, approximately nine percent of the fund was actually appropriated for drinking water protection. The use of this fund is determined by the Minnesota Legislature (Minnesota Session Laws, Chapter 172, Article 2, Section 7).[2] The funding bill allocated monies from the CWF to programs within state and regional agencies 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. An ongoing coordination effort was initiated among these agencies and organizations to systematize activities 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.



As illustrated in the chart, MDH's Source Water Protection (SWP) program received $2,415,000 to increase the number of community water suppliers that develop and implement source water protection plans. Approximately forty percent (or more) of these monies will be provided to public water suppliers via grant programs to implement source water protection strategies.

MDH's Health Risk Assessment (HRA) unit received $1,335,000 to address potential health risks related to contaminants of emerging concern (the Drinking

[1] www.house.leg.state.mn.us/cco/rules/mncon/Article11.htm
[2] www.revisor.mn.gov/laws/?id=172&year=2009&type=0

Water Contaminants of Emerging Concern (CEC) program). Approximately half of these monies will be used for contracted research. The allocation for the CEC program represents less than one percent of total CWF dollars and less than ten percent of the CWF dollars appropriated to drinking water protection.

About the Program

The constitutional amendment specifies that CWF allocations must be used to supplement work, rather than to substitute funding for existing work in water quality. MDH currently provides advice to risk assessors and other interested parties through Health-Based Rules and Guidance for Groundwater[3]. 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 emerging contaminants.

Current Risk Assessment Activities

MDH develops health-based guidance at the request of programs within MDH as well as for other state agencies, or from outside of government. MDH develops and promulgates methods for developing guidance and uses those methods to develop health-based values (HBVs), which are concentrations of chemicals in drinking water at which no adverse health effects would be expected among the general population, including sensitive populations such as pregnant women and infants. Health Risk Limits (HRLs) are HBVs which are promulgated through a formal rulemaking process authorized in the 1989 Groundwater Protection Act (GWPA). Per the GWPA, MDH's authority to promulgate HRLs is limited to chemicals that have been detected in groundwater in Minnesota. MDH also develops Risk Assessment Advice (RAA), which may be based on more limited toxicity data than HBVs or HRLs, or may use new risk assessment methods that are not included in the HRL rules. RAA may include a numerical value or may be qualitative in nature. HRLs, HBVs, and RAA are one set of criteria that state groundwater and environmental protection programs use to evaluate health risks from exposure to contaminants.

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

CEC Risk Assessment Activities

Funding was provided to the CEC program in order to develop guidance for three emerging contaminants by the end of the 2010 fiscal year (FY10, ending June 30 2010) and seven or more emerging contaminants by the end of the 2011 fiscal year (FY11, ending June 30, 2011). The work involves the same review process, to the extent possible, as chemicals undergoing health-based guidance development through other MDH programs.

The following distinctions separate CEC program work from MDH's current work developing health-based advice values through the rulemaking process.

Under the CEC program, MDH will be able to take a more proactive approach to develop health-protective advice values for chemicals that have been detected or have the potential to be detected in Minnesota drinking water sources. For example, chemicals found in surface water or soil may be reviewed under the CEC program if there is a reasonable expectation that drinking water could be impacted.

The CEC program will also conduct an exposure assessment for each contaminant evaluated under the program. These assessments evaluate the use of the contaminants, their occurrence in the environment, and the potential for humans to be exposed.

Defining Contaminants of Emerging Concern

The CEC program defines a "contaminant of emerging concern" as a chemical that has been released to or detected in Minnesota waters (surface water and groundwater) or has the potential to migrate to Minnesota waters, and for which health-based standards either do not exist or need to be updated to reflect new toxicity or occurrence information.

Chemicals evaluated under the CEC program may enter the environment through spills, application, or other releases to surface water or groundwater as a result of land use activities and practices; treated wastewater discharge; septic system, drainfield, or landfill leachate; or improper use and disposal.

If sufficient toxicity data are available to develop an HBV for an emerging contaminant found in groundwater, MDH may include the chemical in a future HRL for groundwater rules revision. If a contaminant is selected for review under the CEC program and the available data are not sufficient to develop quantitative health-based guidance, qualitative guidance will be developed, if feasible.

Chemicals Under Review

The contaminants selected for review under the CEC program for FY10 meet the definition of an emerging contaminant as described above. Particularly in the early years of the program, chemicals selected for review will serve to evaluate a wide spectrum of chemical classes and to develop an ongoing process for selecting chemicals for review (see the Criteria Development section of this report).

Contaminant Selection Process

In order to meet program deadlines, it was determined that MDH staff should move forward with a preliminary process for selecting chemicals in FY10 (completed) and FY11 (in progress). However, soliciting contaminant nominations from a broader stakeholder group in future years is proposed as part of an ongoing outreach effort (discussed under the Communication and Outreach section of this report). A broad stakeholder advisory forum is proposed to nominate contaminants, review criteria developed to date (discussed under the Criteria Development section of this report), and to further refine the contaminant selection and screening process.

MDH selected chemicals for review under the CEC program for FY10 through consultation with MDH staff and staff from other state agencies, review of existing contaminant of concern lists developed by other agencies and organizations, and development of a working definition of and criterion for selecting contaminants of emerging concern.

Meetings were conducted in November and December 2009 that included representatives from MDA, MPCA, and MDH, including the Drinking Water Protection (DWP) section, the Site Assessment & Consultation (SAC) unit, the HRA unit, and the Public Health Laboratory (PHL) division. These meetings included updates from state agencies regarding contaminants that are detected in Minnesota waters through ongoing monitoring activities as well as an update from PHL regarding analytical methods they have developed or are in the process of developing.

MDH developed a preliminary list of chemicals for consideration during the first biennium of the program based on several factors, including input from the meetings noted above; potential for human exposure; representation of a variety of chemical use categories (e.g., pharmaceuticals, agricultural, personal care products, etc.), availability of new toxicity or use information; availability of biomonitoring information; and detection in Minnesota source water based on United States Geological Survey (USGS) and American Water Works Association (AWWA) monitoring data.

Chemicals Reviewed

The contaminants reviewed for FY10 include 1,2,3-TCP, triclosan, and three metribuzin degradates.

1,2,3-TCP was selected for review because of a recent reassessment of the chemical by the United States Environmental Protection Agency (EPA) that indicates an increase in concern about toxic effects at low doses. The reassessment also resulted in the classification of 1,2,3-TCP as a carcinogen.

Triclosan was selected for review because it is an endocrine disruptor that is widely used throughout the state, is commonly detected in bodies of water that receive treated wastewater discharge, and is detected in humans via biomonitoring activities, including those conducted by the National Health and Nutrition Examination Survey (NHANES).

Metribuzin degradates were selected for review based on MDA requests for drinking water health risk guidance due to detections of these compounds in a limited number of groundwater monitoring wells in the Central Sands area of the state beginning in 2000.

Metribuzin is a registered pesticide in Minnesota and is used to control weeds, primarily in potato production, but also in corn and soybean production in certain areas of the state.

Health-Based Guidance

For each chemical reviewed, CEC program staff have generated an exposure and toxicity summary that describes what is currently known about the chemical's patterns of use in Minnesota, the potential for human exposure, the chemical's potential toxicity to humans, and other information relevant to its potential harm to water quality as it pertains to human health. This information is summarized below; refer to Attachments A, B, and C for additional exposure and toxicity information.

New health-based guidance is shared with other state agencies that have water quality regulatory responsibilities or other water quality program activities. New guidance resulting from CEC program activities is described on MDH web pages and notifications sent to more than 1,000 individuals who subscribe to announcements concerning health-based guidance for water. In addition, MDH discusses the results of CEC program activities with a variety of stakeholders (see the Communication and Outreach section of this report for more information).

<u>Metribuzin Degradates</u>

Metribuzin is an herbicide used to control weeds in agricultural settings. In the environment and the human body, it may break down into degradation products (degradates) including: deaminated metribuzin (DA), diketometribuzin (DK), and deaminated diketometribuzin (DADK).

Metribuzin degradates have the potential to contaminate drinking water when rain and irrigation water carry them through the soil into shallow aquifers or transport them to water bodies via surface runoff. The MDA reports that metribuzin and its degradates have been detected in groundwater monitoring wells sampled in potato-growing regions (the Central Sands area) of Minnesota.

MDH has reviewed the available data on the metribuzin degradates, and determined that while there is limited information for DADK indicating toxicity similar to metribuzin, overall there is not enough toxicity data on the degradates to evaluate them directly. Instead, MDH has developed RAA values based on the HBV developed for metribuzin, consistent with current MDH practice. For acute exposure (up to 1 day), the RAA value is 40 micrograms per liter (ug/L) based on developmental and nervous system effects in laboratory animals. For short-term, subchronic, and chronic exposure (one day up to a lifetime,) the RAA value is 10 ug/L based on thyroid effects and effects on the endocrine (hormonal) system in laboratory animals. These RAA values apply to all three degradates.

MDH's 2010 HBVs for metribuzin and the associated RAA values for metribuzin degradates are significantly lower than the 1993 HRL value of 200 ug/L, reflecting new information and data interpretation that indicates toxicity at a lower concentration than in MDH's 1993 assessment. Concentrations of metribuzin degradates in monitoring wells in Minnesota have come close to exceeding, but have not exceeded the RAA values. Available detection limits are below the HBV and RAA values, so it is possible to monitor shallow drinking water wells if there is a concern that metribuzin or its degradates may be present.

<u>1,2,3-Trichloropropane</u>

1,2,3-TCP is a volatile organic compound with various industrial and agricultural uses and has been identified as a contaminant in soil fumigants that are not currently used in Minnesota. Although these fumigants are no longer used in Minnesota, 1,2,3-TCP may still be present in groundwater from past use.

1,2,3-TCP most likely enters the water system through the use of soil fumigants and possibly through disposal

in landfills. 1,2,3-TCP is detected only rarely in Minnesota water, but this may be due to the fact that the most commonly used tests are not capable of detecting the chemical at very low concentrations.

In 1993, MDH established a HRL of 40 ug/L for 1,2,3-TCP based on noncancer effects. In 2010, MDH conducted a thorough review of the available data on the toxicity of 1,2,3-TCP and developed HBVs for noncancer effects at four exposure durations, as well as an HBV for cancer effects. For noncancer effects from acute and short-term drinking water exposure (i.e., one day up to thirty days), the HBV is 20 ug/L based on developmental effects. For longer periods, including subchronic and chronic (lifetime) exposures, the HBV for noncancer effects is 10 ug/L based on liver effects (subchronic) and liver, kidney, and pancreas effects (chronic). Studies show that 1,2,3-trichloropropane is carcinogenic. The HBV based on cancer is 0.003 ug/L.

The 2010 HBV for cancer effects (0.003 ug/L) is significantly lower than the previous MDH guidance value (40 ug/L), which was based on noncancer effects. This means that human health may be at risk at lower levels of exposure than previously known. MDH's revision of its guidance value means that the higher detection limits currently used for analyzing water samples in Minnesota are not adequate to ensure that concentrations of 1,2,3-TCP remain below the HBV. Based on studies in other states, it is possible, though not certain, that concentrations in drinking water sources in parts of the state may exceed the HBV. MDH is pursuing further work to collect surface water and/or groundwater samples and test them using a more sensitive detection limit that would be developed in coordination with the MDH's PHL.

Triclosan

Triclosan is a chemical compound widely used as an antibacterial agent. Triclosan is found in consumer products including some types of liquid soaps, detergents, toothpaste, cutting boards, sponges, textiles, toys, and shower curtains.

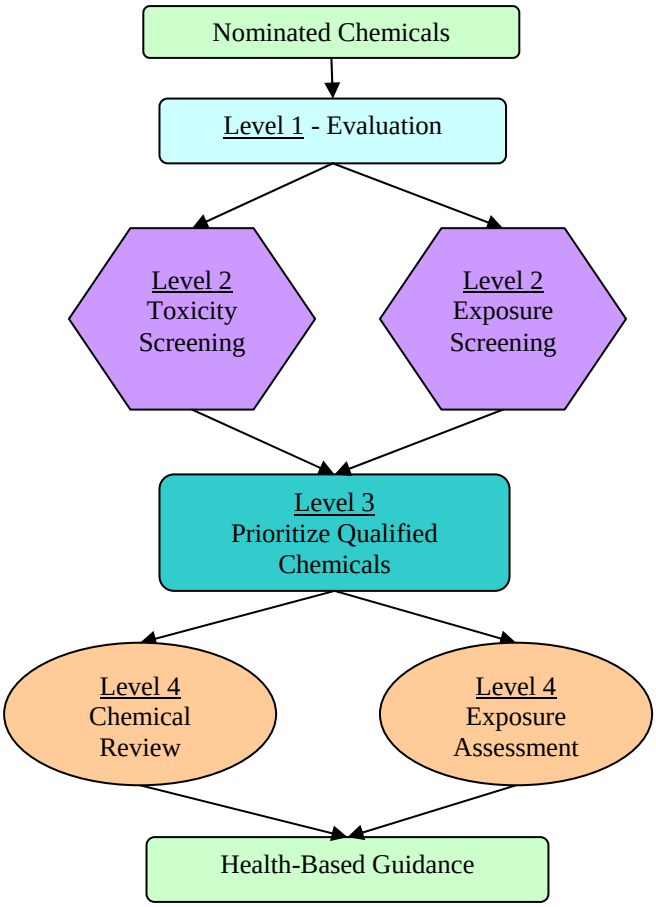
Exposure to triclosan from consumer products may occur through dermal contact or by ingestion. Some inhalation exposure may occur from a few aerosol products that contain triclosan. Triclosan released to the environment may enter the drinking water supply if surface water containing triclosan recharges an aquifer, if wastewater from septic systems or drain fields infiltrates to groundwater, or if surface water contaminated with triclosan is used as a drinking water source. Triclosan accumulates in sewage sludge, and could contaminate crops if the sludge is recycled for agricultural use. Triclosan has been detected in surface water and wastewater in Minnesota.

In 2010, MDH conducted a thorough review of the available data on the toxicity of triclosan and developed HBVs for four exposure durations. For acute (up to one day) drinking water exposure, the HBV is 200 ug/L based on developmental effects in offspring as a result of exposure during pregnancy. For short-term, subchronic, and chronic exposures (more than one day up to a lifetime) the HBV is 50 ug/L based on decreases in thyroid and female hormone levels in the blood. MDH's use of a relative source contribution assumes that substantial exposure occurs from sources other than drinking water, such as consumer products. The concentrations of triclosan detected in Minnesota are lower than the 2010 HBVs.

Criteria Development

MDH staff are moving forward with a preliminary process for selecting chemicals in the first biennium of the program and are proposing to solicit contaminant nominations from stakeholders in future years. Toxicity and exposure criteria are being developed to facilitate a systematic, consistent, and efficient evaluation of chemicals nominated by stakeholders. The criteria will be brought to a Criteria Task Group (discussed under the Communication and Outreach section of this report) for review. The Criteria Task Group will assist MDH in developing a decision tree to assess the likelihood that sufficient data exist to develop health-based guidance for a chemical nominated for consideration. The process for going from a nominated chemical to publication of health-

based guidance is evolving and currently includes the development of criteria for three of the four levels of assessment shown in the draft decision tree below: (Level 1) Evaluation, (Level 2) Toxicity and Exposure Screening, and (Level 3) Prioritization. The Level 4 Assessment shown is consistent with current MDH risk assessment methodology and does not require criteria development.



Levels of Assessment

Chemicals that pass the preliminary evaluation (Level 1 Assessment) and the toxicity and exposure screening (Level 2 Assessment) will be ranked and prioritized (Level 3 Assessment) for full review (Level 4 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 would first be evaluated under the Level 1 Assessment to determine if they meet the definition of a contaminant of emerging concern. The individual, group, agency, or organization who nominated the chemical will be invited to contribute any information they have which may inform the assessment, including why they consider the chemical an emerging concern. Chemicals that meet the definition of a contaminant of emerging concern would then be screened under the Level 2 Assessment to determine if sufficient and suitable data are available to develop health-based guidance using current MDH risk assessment methodologies. Preliminary toxicity and exposure screening criteria for the Level 2 Assessment are being developed by MDH staff and will be brought to the Criteria Task Group for review. Chemicals that pass this screening process would then be ranked and prioritized under the Level 3 Assessment, using ranking criteria that will be developed in partnership with the Criteria Task Group. Health-based guidance would then be developed for chemicals in order of rank under the Level 4 Assessment, consistent with current MDH risk assessment methodologies. The level 4 Assessment would include a literature review, a preliminary chemical review conducted by a designated MDH toxicologist, a secondary chemical review conducted by a different MDH toxicologist, and concluding with review by the full MDH CEC toxicology team. Health-based guidance is posted on the program's Chemical Review[4] web page when reviews are complete.

Continued Criteria Development

As noted, MDH developed a preliminary list of chemicals for consideration during the first biennium in order to initiate the CEC program. This initial list was further evaluated to develop a general overview of the availability of important risk assessment references and toxicity information. MDH staff located potentially suitable toxicity information sources for many, but not all, of the chemicals. Information sources included: current published chemical classifications (i.e., for cancer, reproductive toxicity, etc.), published risk assessment documents, available toxicity tests from primary literature or secondary sources, national and international food additive or

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

drug sources, consumer product and cosmetic ingredient information sources.

MDH staff selected six chemicals to be used to further refine the screening criteria. The six chemicals are DEET (insect repellent), AHTN (fragrance), propylparaben (a preservative in food and personal care products), pyraclostrobin (an agricultural pesticide), carbamazepine (a pharmaceutical), and TCEP (a flame retardant). These chemicals represent a variety of chemical use categories (e.g., personal care products, food additive, agricultural, pharmaceutical). In addition, the preliminary evaluation showed that there is likely to be sufficient toxicity data useful for developing criteria for gauging the likelihood of generating quantitative risk assessments.

MDH staff will use these six contaminants to further refine the toxicity and screening criteria prior to bringing them to the Criteria Task Group for review. These contaminants may or may not be selected as chemicals for review in FY11.

Communication and Outreach

Due to the exceptional public and scientific interest in contaminants of emerging concern, MDH considers it especially important to maintain lines of communication with all interested parties as CEC program work is conducted. To that end, MDH staff are actively engaged in communication and outreach efforts that include regular web updates, e-mail updates via a GovDelivery e-mail subscription service, inter- and intra-agency meetings, and meetings with other stakeholders and interested parties.

Program Website

The CEC program website[5] is updated on a regular basis and interested persons are encouraged to review the website for information about program activities, for a list of chemicals under review, and for toxicity and exposure information for contaminants with completed reviews.

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 opportunities. Interested persons are encouraged to use the website to submit their email address to receive these updates.

Preliminary Outreach

CEC program staff have conducted meetings with representatives from state and federal agencies, including staff from MPCA, MDA, USGS, and internally with staff from DWP and PHL. Additionally, MDH staff have met and/or spoken with researchers from the University of Minnesota's Humphrey Institute and Water Resources Center, researchers from Saint Cloud State University and the University of Saint Thomas, representatives from non profit 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).

Meeting topics included general overviews of CEC program activities, contaminants selected for review in FY10, contaminant monitoring and research activities, and analytical suite development. Meetings with stakeholders are posted and briefly described on the program's Communication[6] web page.

Ongoing Outreach

The work of the program will be facilitated by ongoing collaborative relationships with stakeholders and interested persons, including those noted above. An advisory forum has been proposed that will meet semi-annually to receive program updates, to nominate chemicals for review, and to review the work of the task groups (discussed subsequently). The advisory forum will include representatives from state and federal agencies, academic and industry researchers,

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

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

and nonprofit groups. Meetings of the advisory forum will be open to the public and will be publicized on the program web page.

MDH will convene task groups to address specific charge questions. The task groups will include both advisory forum members and non-forum members who have the expertise required to respond to the applicable charge question.

The first proposed task group is a Criteria Task Group that would assist MDH by reviewing the criteria for evaluating nominated chemicals developed to date, developing criteria to rank and prioritize chemicals (Level 3 Assessment), and developing a decision tree to assess the likelihood that health-based guidance could be developed for a chemical nominated for consideration. It is anticipated that this task group would meet approximately six times over the coming fiscal year.

Research and Special Projects

Approximately half of the monies allocated to the CEC program are proposed for contract research on the risks, toxicity, or occurrence of contaminants. MDH staff are currently developing research initiatives to support evaluation of contaminants of emerging concern in drinking water.

The first project initiated under the CEC program is the Evaluating, Testing, and Reporting of Alternative Risk Assessment Methods project. A request for proposals (RFP) for this project was published in the State Register in March 2010. Five proposals were received in response to the RFP and critically evaluated by a review committee. The project is anticipated to be complete in approximately two years from the start date.

Alternative Risk Assessment Project Description

As noted in the Ongoing Challenges section of this report, toxicological data can be lacking or unavailable for contaminants of emerging concern such as pharmaceuticals and hormonally active chemicals. Current MDH risk assessment methods require a requisite level of data in order to develop numerical health-based guidance and therefore, a lack of available data makes developing numerical health-based guidance for some chemicals infeasible. Consequently, this project proposes to assess the validity of using alternative risk assessment methods to evaluate chemicals with limited or unavailable toxicity datasets.

The proposed project will include identifying, describing, critiquing, and testing alternative methods for assessing risks from exposures to contaminants of emerging concern. The alternative risk assessment methods will be compared and recommendations on which are optimal to evaluate life stage sensitivity, susceptible populations (e.g. drug allergies), uncertainties and gaps in available data, and health risks from mixtures of chemicals will be developed. It is anticipated that the outcome of the project will be the identification and verification of alternative risk assessment methods that are capable of generating health-protective guidance that is consistent with guidance developed using current state risk assessment methodology. For example, a margin of exposure approach is anticipated to be evaluated as part of this project. Margin of exposure compares the ratio of a no effect or minimal lowest observed adverse effect level to the estimated exposure dose. A minimum of five substances that are found in or have the potential to be found in Minnesota drinking water sources will be assessed utilizing the recommended alternative methods.

The results of this work will be evaluated by a peer review panel and will be communicated via the program's web page and through the GovDelivery email subscription service. Information will be conveyed to other state and federal agencies in presentations at a minimum of two national scientific professional meetings. Contingent on the outcome of the peer review panel, and at the discretion of MDH, a public seminar and a technical training workshop presenting the results will be held for Minnesota risk assessors, regulators, and the public.

The goals of this project include:

- development of a process that maximizes the ability to provide health-based guidance to the public and regulators and to minimize the situations where it is infeasible to provide guidance due to lack of chemical specific toxicity data;
- advancement of the scientific and policy discussion regarding risk assessment methods for chemicals with insufficient data;
- expansion of the number of available risk assessment methodologies for the evaluation of potential human health risks from contaminants of emerging concern in drinking water; and
- creation of a pool of trained staff who have the knowledge to appropriately select and utilize a variety of risk assessment methods for a wide range of chemicals.

Future Research Opportunities

CEC program staff are considering additional projects for future funding including an evaluation of default relative source contribution factors that account for other sources of exposure besides drinking water.

Ongoing Challenges

During the program's first year of evaluating potential chemical exposures to emerging contaminants via drinking water, several challenges have emerged. Challenges include: reliability of a default relative source contribution factor, cumulative impacts of chemical exposures, sensitivity of analytical methodologies for some chemicals, and accessibility of data for some chemicals that may be considered proprietary confidential business information.

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 deliberate ingestion or application to the body may result in far higher exposure than exposure via drinking water. CEC staff are currently working to address this issue, possibly through a change to current conventions regarding the relative source contribution (RSC) factor. The RSC is used to account for the possibility of multiple exposure sources (such as food, water, air, consumer products) or routes of exposure (such as ingestion, inhalation, or dermal absorption). MDH typically utilizes a default relative source contribution factor of 20 percent, which assumes that 80 percent of exposures come from exposures other than ingestion of drinking water. MDH does not know if this is the most appropriate default assumption to apply to all contaminants. Dedicated funding will allow MDH to explore ways to appropriately characterize multiple sources and routes of exposure. MDH may initiate evaluation of this issue as a research project under the CEC program in the coming fiscal year.

Additionally, exposure to many contaminants of emerging concern occur at relatively low levels, but potentially for long durations and across large populations. Also, there are thousands of chemicals used in commerce in the United States, and it is common for many chemicals to share a single toxic effect or health endpoint. Therefore, MDH may consider future research projects that evaluate the risks from chemical mixtures to quantitatively address the potential for additivity, synergism, and antagonism among these chemicals.

Furthermore, for some contaminants of emerging concern, it is difficult to assess exposure in a meaningful way because the concentrations that pose a health concern are lower than current laboratory detection limits used. MDH staff are considering initiating projects to develop more sensitive analytical methodologies.

In addition, challenges remain in locating adequate toxicity data for some chemicals, including many pharmaceuticals. There is inconsistency in the availability and quality of information available on the US Food and Drug Administration (FDA) website and in most cases, details of the study data are considered proprietary for the drug manufacturers. Also, all FDA drug information is filed under the original drug trade name for the company that originally filed for FDA approval. Once a drug gets multiple names and is produced by multiple manufacturers, it can be difficult

to determine the original submission name and locate pertinent information.

Summary

In the past fiscal year, the CEC program has developed health-based guidance and exposure assessments for three contaminants (metribuzin degradates, 1,2,3-TCP, and triclosan), engaged stakeholders, developed criteria for selecting contaminants for review, and initiated a research project to evaluate alternative risk assessment methodologies. In coming years, the CEC program will address ongoing challenges while continuing to provide valuable information regarding the health impacts and exposure potential of contaminants of emerging concern. Additionally, the program will continue to expand education and 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.

Attachments

Exposure and Toxicity Summaries

Drinking Water Contaminants of Emerging Concern Program
A Minnesota Clean Water Fund Initiative
July 2010

Metribuzin Degradates (DA, DK, DADK)

Exposure and Toxicity Summary

Metribuzin Degradates *have undergone a review under the Minnesota Department of Health's (MDH's) Drinking Water Contaminants of Emerging Concern (CEC) program. Contaminants of emerging concern are chemicals that have been detected in Minnesota waters, or have the potential to be released to Minnesota waters, and for which current health-based guidance is outdated or nonexistent. Under the CEC program, MDH staff investigate and report on possible routes of exposure, the presence of the chemical in groundwater and surface water, and the toxic effects of the chemical. Where possible, staff develop health-based guidance, such as a Health-Based Value (HBV) or Risk Assessment Advice (RAA), that can be used to assess health risks from exposure to the contaminant in drinking water. HBVs for groundwater contaminants can be converted to Health Risk Limits (HRLs) through administrative rulemaking.***

What are metribuzin degradates?

Metribuzin is an herbicide used to control weeds in agricultural settings. In the environment, it may break down into three primary degradation products (degradates): deaminated metribuzin (DA), diketometribuzin (DK), and deaminated diketometribuzin (DADK). Metribuzin can be used on broadleaf weeds and grasses, both pre-and post-emergence, i.e., before or after the weed begins to grow. Metribuzin was first registered in the United States in 1973. In Minnesota, metribuzin is registered for use on several crops, including potatoes, corn, and soybeans. However, it is used almost exclusively on potatoes because other products are considered more suitable for corn and soybeans. When used on potatoes, metribuzin is applied at the time of planting.

Why does MDH consider metribuzin degradates to be an emerging concern?

Metribuzin degradates are an emerging concern for three reasons. First, metribuzin degradates are known to be present in Minnesota groundwater, though they are typically found only in shallow monitoring wells, not in drinking water wells.

Second, because of their chemical properties, metribuzin and its degradates are easily transported in groundwater and degrade very slowly in the soil;[1] this makes it easier for the degradates to impact water supplies at a great distance from where they are used or disposed of.

Third, until the current evaluation, MDH had no up-to-date guidance on metribuzin degradates. Because little toxicity data is available for the degradates, MDH has used the 1993 Health Risk Limit (HRL) of the parent compound, metribuzin, to assess the potential drinking water risks from the degradates. In its 2010 CEC guidance on the degradates, MDH still uses the parent compound, but the 1993 HRL has been updated to a 2010 HBV using newer toxicity and exposure data.

How do metribuzin degradates get into the environment?

Metribuzin degradates are transported to the water system when rain and irrigation water carry them through the soil into shallow aquifers, or transport them to water bodies via surface runoff. Pesticide application regulations are based in part on preventing this contamination. When contamination occurs, the Minnesota Department of Agriculture (MDA) takes additional steps to protect the environment. MDA has developed a set of metribuzin best management practices (BMPs), which are voluntary guidelines that go beyond the mandatory use restrictions on the product label. The BMPs for metribuzin include reducing the amount used and alternating the use of metribuzin annually with other, unrelated herbicides.

* An HBV or HRL is a concentration at which no adverse health effects would be expected among the general population, including sensitive populations such as pregnant women and infants. RAA, which may be quantitative or qualitative in nature, is developed when the data are insufficient to develop an HBV.

MDA reports that metribuzin and its degradates have been detected in groundwater samples from monitoring wells in potato-growing regions (the Central Sands area) of Minnesota since monitoring for the degradates began in 2000. The monitoring wells are located in areas deemed to be vulnerable to contamination, e.g., areas with shallow groundwater and high soil permeability. Among metribuzin and degradate detections, metribuzin DADK concentrations are highest, with maximum values ranging from 9.28 ug/L (2006) to 2.23 ug/L (2008).

In urban areas in Minnesota, out of 51 wells tested, metribuzin and metribuzin DADK were each detected in 2 out of 2 samples in one well (mean concentration 0.52 for metribuzin, 1.93 ug/L for metribuzin DADK.) Metribuzin DA and metribuzin DK were not detected in any urban well.

In a 1992 study of surface water in the Midwestern United States, metribuzin was detected in 2% of 55 preplanting samples, with a detection limit of 0.05 ug/L. The maximum concentration detected was 0.16 ug/L. In 132 samples taken after planting, metribuzin was detected in 53% of the samples, with a median detection of 0.14 ug/L and a maximum detection of 7.6 ug/L. In 145 samples taken at harvest, metribuzin was not detected in any sample. Some of the sampling for this study occurred in the southern half of Minnesota; the rest occurred in other Midwestern states.[2]

EPA's 2003 Health Effects Support Document for Metribuzin presents a summary of groundwater and surface water monitoring completed under the U.S. Geological Survey's National Ambient Water Quality Assessment program.[3] Metribuzin is detected in surface water in urban and agricultural areas at concentrations up to 0.53 ug/L. In groundwater, metribuzin is detected in urban and agricultural areas at concentrations up to 0.3 ug/L. For both groundwater and surface water, detection frequencies and concentrations tend to be higher in agricultural areas than urban areas.[4]

Metribuzin has been detected in runoff water from soybean plots treated with metribuzin at a site in Louisiana. Concentrations ranged from 1.5 to 56.2 ug/L. Degradates were not analyzed.[5]

Metribuzin was not detected in any of 398 private drinking water wells in Wisconsin in a 2007 statewide survey (limit of detection: 0.03 ug/L). Degradates were not analyzed.[6]

How are people exposed to metribuzin degradates?

People could be exposed to metribuzin degradates if contaminated groundwater or surface water is used for drinking. Exposures may vary by season due to the application schedule of the herbicide. The sampling schedules for MDA groundwater monitoring wells include spring and fall samples, and several MDA surface water sampling locations monitor throughout the growing season in order to define peak concentrations.

There is some concern for human exposure to metribuzin degradates through the diet. The U.S. Department of Agriculture tests agricultural products for pesticide residues. Metribuzin is found only rarely.[7] In a 1976 study, metribuzin and metribuzin DK were detected in Russet Burbank potatoes at concentrations that varied in proportion to the metribuzin application rate.[8] Residues were higher when treatment was applied to more mature plants, i.e., closer to harvest.

Are metribuzin degradates hazardous to human health?

In assessing risks to human health from chemical exposure, MDH scientists usually rely on studies of the chemical's effects on laboratory animals and make adjustments for the potential for humans to be more sensitive than animals. MDH has reviewed the available data on metribuzin degradates, and determined that while there is limited information for DADK indicating toxicity similar to metribuzin, overall there is not enough toxicity data on the degradates to evaluate them directly. Instead, MDH has developed RAA values based on the parent compound, metribuzin. For acute exposure (up to 1 day), the RAA value is 40 ug/L based on developmental and nervous system effects in laboratory animals. For short-term, subchronic, and chronic exposure (one day up to a lifetime), the RAA value is 10 ug/L based on thyroid effects and effects on the endocrine (hormonal) system in laboratory animals. These RAA values, based on metribuzin, apply to all three metribuzin degradates.[9]

Are metribuzin degradates in drinking water a health risk to Minnesotans?

MDH's 2010 HBVs for metribuzin and the associated RAA values for metribuzin degradates are significantly

lower than the 1993 HRL value for metribuzin of 200 ug/L, reflecting new information and data interpretation that indicates toxicity at a lower concentration than in MDH's 1993 assessment. Based on the environmental monitoring described above, there are locations and times when surface water concentrations of metribuzin have exceeded the RAA values. Concentrations of metribuzin degradates in monitoring wells (*not* drinking water wells) in Minnesota have come close to exceeding the RAA values. Potential exposure to metribuzin degradates appears to be highest for people living in potato-growing regions of Minnesota who get their drinking water from wells. Fortunately, laboratory detection limits are well below the RAA values, so it is possible to monitor shallow drinking water wells if there is a concern that metribuzin or its degradates may be present.

What ongoing work is being done on metribuzin degradates?

MDA periodically tests groundwater in monitoring wells for metribuzin and its degradates.[10] With the establishment of an updated guidance value by MDH, decisions about potential health risks from exposure will now be based on the most current available information.

For More Information

For more information on the CEC program, including information on completed and upcoming chemical reviews, visit the program website at www.health.state.mn.us/divs/eh/risk/guidance/dwec/index.html

CEC program staff work within the MDH Health Risk Assessment Unit. Staff can be reached at (651) 201-4899, or at health.risk@state.mn.us.

Program dollars are provided by the Clean Water Fund (from the Clean Water, Land and Legacy Amendment). To learn more about the Clean Water Fund, visit www.cdf.leg.mn/clean-water-fund.

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Drinking Water Contaminants of Emerging Concern Program
A Minnesota Clean Water Fund Initiative
July 2010

1,2,3-Trichloropropane

Exposure and Toxicity Summary

1,2,3-Trichloropropane *has undergone a review under the Minnesota Department of Health's (MDH's) Drinking Water Contaminants of Emerging Concern (CEC) program. Contaminants of emerging concern are chemicals that have been detected in Minnesota waters, or have the potential to be released to Minnesota waters, and for which current health-based guidance is outdated or nonexistent. Under the CEC program, MDH staff investigate and report on possible routes of exposure, the presence of the chemical in groundwater and surface water, and the toxic effects of the chemical. Where possible, staff develop health-based guidance, such as a Health-Based Value (HBV) or Risk Assessment Advice (RAA), that can be used to assess health risks from exposure to the contaminant in drinking water. HBVs for groundwater contaminants can be converted to Health Risk Limits (HRLs) through administrative rulemaking.***

What is 1,2,3-trichloropropane?

1,2,3-trichloropropane (1,2,3-TCP) is a volatile organic compound (VOC) with various industrial and agricultural uses. 1,2,3-TCP is used as a solvent and extractive agent, paint and varnish remover, cleaning and degreasing agent, cleaning and maintenance reagent, and as an intermediate in the manufacture of other chemicals.

1,2,3-TCP has also been identified as a contaminant in soil fumigants no longer registered for use in Minnesota, including 1,2-dibromo-3-chloropropane (DBCP), ethylene dibromide (EDB), and DD (a mixture of dichloropropane and dichloropropene). 1,2,3-TCP was not the active ingredient in these pesticides, but may have been present at low concentrations (up to 0.17%) as a byproduct of manufacturing.[1] Many of the pesticides to which 1,2,3-TCP has been linked have been removed from the market or have not been used in Minnesota for twenty years or more, but 1,2,3-TCP may still be present in groundwater and drinking water from past use.

Why does MDH consider 1,2,3-TCP to be an emerging concern?

1,2,3-TCP is an emerging concern because recent studies have shown it to be more toxic than previously known, and it may be present in groundwater and drinking water. Recent evaluations of 1,2,3-TCP by the U.S. Environmental Protection Agency (EPA)[2] and some state government agencies have indicated an increase in concern about toxic effects at low doses. In 1993, MDH set an HRL of 40 micrograms per liter (ug/L) for 1,2,3-TCP based on noncancer effects. Since 1993, additional studies of laboratory animals have shown a link between 1,2,3-TCP exposure and cancer. At least two states, New Jersey and Hawaii, have health-based guidance values that are lower (more stringent) than the current MDH HRL.

1,2,3-TCP is detected only rarely in Minnesota water, but this may be due to the fact that the most commonly used tests are not capable of detecting 1,2,3-TCP at very low concentrations. In recent years, some states have begun to use a more sensitive method and have found 1,2,3-TCP in groundwater and drinking water. For these reasons, 1,2,3-TCP is a good candidate for evaluation as a chemical of emerging concern.

How does 1,2,3-TCP get into the environment?

Based on the locations where it has been found, releases of 1,2,3-TCP to the environment are most likely to occur through the use of soil fumigants, and possibly through the disposal in landfills of chemical products containing 1,2,3-TCP.

The Minnesota Pollution Control Agency (MPCA) maintains a database of water samples collected at

* An HBV or HRL is a concentration at which no adverse health effects would be expected among the general population, including sensitive populations such as pregnant women and infants. RAA, which may be quantitative or qualitative in nature, is developed when the data are insufficient to develop an HBV.

closed landfills. A total of 54,288 samples were analyzed for 1,2,3-TCP between 1998 and 2007, with reporting limits ranging from 0.11 to 1000 ug/L. 1,2,3-TCP was detected only once, at a concentration of 4.3 ug/L at a landfill in north central Minnesota in 2001. No further information is available on this single detection in groundwater, and it is not known whether the source is from domestic and industrial waste, or from discarded pesticide products.

MDH's public drinking water supply database indicates that 1,2,3-TCP has not been detected in any sample in the last decade. No data are available prior to 2000. The detection limit for most of the samples in the database was 0.5 ug/L. This is lower than the old MDH HRL of 40 ug/L, but higher than the new MDH HBV calculated in the CEC review (see below).

1,2,3-TCP has been detected in groundwater samples from Europe, Canada, and the United States at concentrations ranging from 0.86 to 5.6 ug/L. Studies of 1,2,3-TCP in U.S. drinking water have found the chemical in some locations (Hawaii, 0.1 ug/L; California, 0.24 ug/L).[3]

In states where 1,2,3-TCP has been detected in groundwater at low concentrations, its presence has been linked to use of soil fumigants.[4] The New Jersey Department of Environmental Protection (NJDEP) studied the occurrence of 1,2,3-TCP in that state, and found that 1,2,3-TCP concentrations exceeded New Jersey's newly revised health-based guidance value (0.005 ug/L) in 1.1% of private wells sampled during contaminated site investigations. NJDEP also detected 1,2,3-TCP above its guidance value in 4% of 260 community water systems tested.

In Whatcom County, Washington, 1,2,3-TCP is a contaminant of concern in groundwater. No point sources were identified, leading to the conclusion that the contamination is most likely from past widespread use of soil fumigants.[5]

In Hawaii, 1,2,3-TCP was identified as an impurity in the soil fumigant DD and has been detected at 0.71 ug/L in one drinking water well. Hawaii uses a guidance value of 0.6 ug/L.[6]

How are people exposed to 1,2,3-TCP?

A person may be exposed to 1,2,3-TCP if water containing 1,2,3-TCP is used for drinking, showering, bathing or cooking. Treatment of drinking water by a water utility or at the point of use may remove some of the 1,2,3-TCP; the exact percentage is not known and will depend on the method of treatment. Because 1,2,3-TCP is volatile, it migrates readily from water to air; this is why 1,2,3-TCP is not commonly found in surface water.

The state of New Jersey has expressed concern about exposure to 1,2,3-TCP via drinking water. 1,2,3-TCP is a byproduct of the manufacture of epichlorohydrin and may be present in products containing epichlorohydrin. Among other uses, epichlorohydrin is used in the production of coagulants used in water treatment, and in the coatings of drinking water pipes.

Although 1,2,3-TCP can be measured in blood, urine, and breath, no relevant studies that examine levels of 1,2,3-TCP in human specimens are available.

Is 1,2,3-TCP hazardous to human health?

In assessing risks to human health from chemical exposure, MDH scientists usually rely on studies of the chemical's effects on laboratory animals and make adjustments for the potential for humans to be more sensitive than animals. In 2010, MDH conducted a thorough review of the available data on the toxicity of 1,2,3-TCP and developed HBVs for noncancer effects at four exposure durations, as well as an HBV for cancer effects. For noncancer effects from acute exposure (up to one day), the HBV is 20 ug/L based on developmental effects in offspring resulting from exposure before mating and during pregnancy. For short-term exposure (one day up to thirty days), the HBV is 20 ug/L based on developmental effects as described above, liver effects, and kidney effects. For longer periods, including subchronic and chronic (up to a lifetime) exposures, the HBV for noncancer effects is 10 ug/L based on liver effects (subchronic) and liver, kidney, and pancreas effects (chronic).

The cancer assessment for 1,2,3-trichloropropane has resulted in a cancer HBV of 0.003 ug/L, based on the incidence of multiple tumors in laboratory animals.[7] This study has also been used by the U.S. EPA and the state of California in cancer assessments for 1,2,3-TCP.

Is 1,2,3-TCP in drinking water a health risk to Minnesotans?

MDH's review of 1,2,3-TCP through the CEC program has resulted in a major change to the guidance value for 1,2,3-TCP. The 2010 HBV for cancer effects is

significantly lower than the previous MDH guidance value, which was based on noncancer effects. This means that human health may be at risk at lower levels of exposure than previously known. MDH's revision of its guidance value means that the higher detection limits currently used for analyzing water samples in Minnesota are not adequate to ensure that concentrations of 1,2,3-TCP remain below the HBV. Based on studies in other states, it is possible, though not certain, that groundwater concentrations in parts of the state may exceed the HBV.

What ongoing work is being done on 1,2,3-TCP?

Because of the significant change in the guidance value for 1,2,3-TCP, MDH is pursuing further work to collect surface water and/or groundwater samples and test them using a more sensitive detection limit that would be developed in coordination with the MDH's Public Health Laboratory. MDH will publicize any findings on its website. MDH is also keeping up-to-date on similar activities in other states.

MDH will provide consultation and technical support to state monitoring and enforcement programs that address the exposure concerns raised by this new health risk assessment.

If 1,2,3-TCP is detected in groundwater in Minnesota, MDH may include 1,2,3-TCP in a future revision of the Health Risk Limits rules, resulting in the conversion of the HBVs to promulgated HRLs.

MDH will also evaluate the potential for environmental breakdown products of 1,2,3-TCP to be present in water.

For More Information

For more information on the CEC program, including information on completed and upcoming chemical reviews, visit the program website at www.health.state.mn.us/divs/eh/risk/guidance/dwec/index.html

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Drinking Water Contaminants of Emerging Concern Program
A Minnesota Clean Water Fund Initiative
July 2010

Triclosan

Exposure and Toxicity Summary

Triclosan *has undergone a review under the Minnesota Department of Health's (MDH's) Drinking Water Contaminants of Emerging Concern (CEC) program. Contaminants of emerging concern are chemicals that have been detected in Minnesota waters, or have the potential to be released to Minnesota waters, and for which current health-based guidance is outdated or nonexistent. Under the CEC program, MDH staff investigate and report on possible routes of exposure, the presence of the chemical in groundwater and surface water, and the toxic effects of the chemical. Where possible, staff develop health-based guidance, such as a Health-Based Value (HBV) or Risk Assessment Advice (RAA), that can be used to assess health risks from exposure to the contaminant in drinking water. HBVs for groundwater contaminants can be converted to Health Risk Limits (HRLs) through administrative rulemaking.***

What is triclosan?

Triclosan is a chemical compound widely used as an antibacterial agent. Triclosan is used in many consumer products labeled with "antibacterial" or "antimicrobial" claims, including some types of liquid soaps, detergents, toothpaste, cutting boards, sponges, and other products where elimination of bacteria is desired by consumers. Triclosan is also used as a material preservative in products such as personal care items, textiles, toys, and shower curtains.

MDH recommends against using antibacterial products in most home applications because they are no more effective than non-antibacterial alternatives and may contribute to the emergence of resistant strains of bacteria.[1]

Why does MDH consider triclosan to be an emerging concern?

Triclosan is a chemical of emerging concern because it is a commonly used chemical ingredient in personal care and household products, and occurrence of triclosan in the environment has been widely reported. Prior to the current review, MDH had no health-based guidance for triclosan and had not evaluated any research on the health effects of exposure to triclosan. Minnesotans are likely to be exposed to the chemical through the use of consumer products. Exposure may also occur from drinking water because wastewater treatment does not remove 100% of triclosan, and the quantity of the chemical that is released has the potential to impact both public and private drinking water supplies. Triclosan may also be released to groundwater through septic systems, drain fields, or infiltration of wastewater.

How does triclosan get into the environment?

The most common route by which triclosan enters the environment is though municipal wastewater. Personal care products containing small quantities (typically 0.1% to 0.3%) of triclosan are washed down drains into the wastewater system. As noted, conventional wastewater treatment does not remove 100% of triclosan. While triclosan degrades rapidly in surface water,[2] it is also replenished by ongoing discharges of treated wastewater.

MDH's drinking water database and the Minnesota Pollution Control Agency's (MPCA's) database of groundwater samples collected at closed landfills do not include any data relating to triclosan. However, the U.S. Geological Survey detected triclosan in samples collected from Minnesota wastewater and surface water at concentrations ranging from 0.088 to 4.3 micrograms per liter (ug/L).[3] Additionally, a 2009 study of river, wastewater, and tap water samples from the Red River region of Minnesota and North Dakota detected triclosan at up to 3,000 ug/L in wastewater, but only a small amount, less than 0.02 ug/L, was detected in river water and tap water.[4]

* An HBV or HRL is a concentration at which no adverse health effects would be expected among the general population, including sensitive populations such as pregnant women and infants. RAA, which may be quantitative or qualitative in nature, is developed when the data are insufficient to develop an HBV.

How are people exposed to triclosan?

The U.S. Environmental Protection Agency (EPA) evaluated triclosan and found that the use of consumer products containing triclosan is a primary source of human exposure.[5] Exposure through consumer products may occur through dermal contact or by ingestion. Some inhalation exposure may occur from a few aerosol products that contain triclosan. Triclosan released to the environment may enter the drinking water supply if surface water containing triclosan recharges an aquifer, if wastewater from septic systems or drain fields infiltrates to groundwater, or if surface water contaminated with triclosan is used as a drinking water source. Triclosan accumulates in sewage sludge, and could contaminate crops if the sludge is recycled for agricultural use.

Triclosan was measured in urine in a sample of 2,517 people representative of the general U.S. population aged 6 years and older. Triclosan was detected in 75% of samples at concentrations ranging from 2.4 to 3,790 ug/L.[6] Triclosan has also been detected in human breast milk,[7] but this exposure has been linked to the use of personal care products containing triclosan rather than to consumption of drinking water.[8] A person's exposure may be reduced by limiting the use of products containing triclosan.

Is triclosan hazardous to human health?

Several studies of individuals using toothpaste and mouthwash containing triclosan have shown no significant effects on blood chemistry or kidney and liver function. Skin irritation has been reported by a small portion (less than 1%) of persons testing products containing triclosan on their skin.

In assessing risks to human health from chemical exposure, MDH scientists usually rely on studies of the chemical's effects on laboratory animals and make adjustments for the potential for humans to be more sensitive than animals. In 2010, MDH conducted a thorough review of the available data on the toxicity of triclosan and developed HBVs for four exposure durations. For acute (up to one day) drinking water exposure, the HBV is 200 ug/L based on developmental effects in offspring resulting from exposure during pregnancy. For short-term, subchronic, and chronic exposures (more than one day up to a lifetime) the HBV is 50 ug/L based on decreases in thyroid and female hormone levels in the blood.[9] MDH's use of a relative source contribution assumes that substantial exposure occurs from sources other than drinking water, such as consumer products.

Is triclosan in drinking water a health risk to Minnesotans?

Concentrations of triclosan detected in Minnesota are lower than MDH's 2010 HBVs. EPA estimates that individuals with exceptionally high use of products containing triclosan may be exposed to levels that are within 100-fold of levels associated with hormonal changes in laboratory animals.[10]

What ongoing work is being done on triclosan?

MDH is currently conducting a study to determine the concentration of triclosan in the urine of pregnant women at a Minneapolis clinic.[11] Many U.S. states and academic researchers are involved in testing water for triclosan; MDH is keeping up with this research both in and out of Minnesota. Measured concentrations in the environment will continue to be compared to MDH's guidance values to assess potential health risks.

If triclosan is detected in groundwater in Minnesota, MDH may include triclosan in a future revision of the Health Risk Limits rules, resulting in the conversion of the HBVs to promulgated HRLs.

MDH will also evaluate the potential for environmental breakdown products of triclosan to be present in water.

For More Information

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CEC program staff work within the MDH Health Risk Assessment Unit. Staff can be reached at (651) 201-4899, or at health.risk@state.mn.us.

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