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MINNESOTA MDH DEPARTMENT OF HEALTH

Protecting, maintaining and improving the health of all Minnesotans

March 24, 2008

Senator Satveer S. Chaudhary,
Chair, Senate Environment and Natural Resources Committee
205 State Capitol
75 Rev Dr Martin Luther King Jr. Blvd
St. Paul, Minnesota 55155-1606

Representative Paul Thissen,
Chair, House Health and Human Services Committee
351 State Office Building
100 Rev Dr Martin Luther King Jr. Blvd
St. Paul, Minnesota 55155-1206

Senator John Marty,
Chair, Senate Health, Housing, and Family Security Committee
328 State Capitol
75 Rev Dr Martin Luther King Jr. Blvd
St. Paul, Minnesota 55155-1606

Representative Kent Eken,
Chair, House Environment and Natural Resources Committee
575 State Office Building
100 Rev Dr Martin Luther King Jr. Blvd
St. Paul, Minnesota 55155-1206

Dear Senators Chaudhary and Marty; Representatives Thissen and Eken:

The "Water level standards" legislation passed during the 2007 regular session required the Minnesota Department of Health (MDH) to carry out four tasks related to establishing health risk limits for ground water contaminants. This letter summarizes progress on those tasks. Complete text of the legislation (Minnesota Session Laws 2007, Chapter 147, Article 17, section 2) is attached (attachment A).

Three of the four tasks in the "Water level standards" legislation pertain to establishing drinking water levels (Health Risk Limits or HRLs). HRLs are values (water concentrations) for individual contaminants that are present in Minnesota groundwater due to human activity. These values are used by state agencies to make risk management decisions concerning ground water contamination (such as contaminated site remediation decisions and providing drinking water advice to users of private wells).

The MDH has completed the following three tasks, described in the legislation, on establishing HRLs:

- Requirement: Establish new Health Risk Limits (HRLs) for eleven contaminants that met the test of having a federal maximum contaminant level that is lower than the HRL value (the 1993/1994 HRL values). Completed: In July 2007 the maximum contaminant level for each of these eleven contaminants became the new HRL for the contaminant (attachment B).
- Requirement: Develop draft HRLs for ten common contaminants found in Minnesota ground water. Completed: MDH worked with other state agencies to identify and rank contaminants (attachment C) and developed draft HRLs (attachment D).

- Requirement: Develop a draft revision of the HRL rules that includes ten common contaminants. Completed: Sent a proposed revision of the HRL rules to the Office of the Revisor on January 22, 2008. MDH expects to publish the revised rules and Statement of Need and Reasonableness in April 2008.

The fourth and final requirement of the legislation was focused on public water supplies. The legislation directed MDH to report to the legislature on the public health impacts and costs to enforce water level standards based on certain HRL values. This letter, in lieu of a report, responds to the legislation's requirement for a cost-benefit analysis.

MDH uses the federal (U.S. Environmental Protection Agency or EPA) maximum contaminant level (MCL) values as the standards that must be met for public water supplies. MCL values are not strictly health-based values and may be higher or lower than health-based calculations. The values may be lower (that is, more stringent) when EPA has determined that lower values are achievable (for example, filtration is inexpensive and simple) and desirable. The values may be higher when EPA has determined that lower values are not achievable or that the cost of attaining lower values is greater than the benefit to public health.

In contrast to the process of weighing risks, benefits, and monetary costs that is used to establish an MCL for public water supplies, the HRL values are developed solely on the basis of public health considerations. The development of a HRL value does not take into account goals for nondegradation (as in the Groundwater Protection Act, MN Statutes 103H.001), the feasibility of removing a contaminant, the extent to which the contaminant can be measured in water, or the costs and benefits of attaining a specific concentration in water. These concerns are part of the risk management responsibilities of the Minnesota programs and agencies (such as the Minnesota Department of Agriculture or Minnesota Pollution Control Agency) that use the HRL values to make decisions about human exposures or the protection of a water resource.

When the "Water level standards" legislation was passed in 2007, MDH identified twenty-two chemicals that have a current HRL value (found in the 1993/1994 HRL rules) that is lower than the current MCL value. It is these contaminants that would be subject to the cost-benefit analysis described in the legislation. However, MDH anticipates publishing in April 2008 a proposed revision of the HRL rules that would supplant the 1993/1994 rules. MDH therefore considered these new values in determining the scope of the cost-benefit analyses described in the legislation.

MDH has prepared draft revised rules for 15 chemicals that also have MCL values (attachment D). At this time:

- Nine of the 15 draft HRL values are based on MCLs and have exactly the same value as the MCL. These chemicals would not be subject to cost-benefit analysis as the MCLs will continue to be enforced for public water supplies.

- Two chemicals (1,1,1-trichloroethane and alachlor) have a draft HRL value that is higher than the corresponding MCL.[1] These chemicals would not be subject to cost-benefit analysis as the MCLs will continue to be enforced for public water supplies.
- Four chemicals (benzene, chloroform, cis-1,2-dichloroethylene, and vinyl chloride) have a draft HRL value that is lower than the corresponding MCL value. These chemicals would be subject to the cost-benefit analysis required in the legislation.

MDH considered the work that would be involved in comparing the costs and benefits of enforcing the lower value for the four chemicals (benzene, chloroform, cis-1,2-dichloroethylene, and vinyl chloride). MDH found that the legislation (attachment A) directs MDH to conduct essentially the same public health cost-benefit analysis that is conducted by EPA Office of Water when an MCL is established. EPA describes the process (as required by the federal Safe Drinking Water Act) as follows:

> "The 1996 Amendments to Safe Drinking Water Act require EPA to go through several steps to determine, first, whether setting a standard is appropriate for a particular contaminant, and if so, what the standard should be. Peer-reviewed science and data support an intensive technological evaluation, which includes many factors: occurrence in the environment; human exposure and risks of adverse health effects in the general population and sensitive subpopulations; analytical methods of detection; technical feasibility; and impacts of regulation on water systems, the economy and public health." (*from EPA website http://www.epa.gov/safewater/standard/setting.html*)

In order to understand and evaluate the work that would be involved in a cost-benefit analysis, MDH reviewed the cost-benefit analyses that were conducted by the EPA in establishing the MCL for disinfection by-products. This assessment included chloroform as one of the by-products of disinfection. The process of disinfecting drinking water leaves chemical by-products in the water. The lingering presence of the by-products is a necessary and desirable result of disinfection. The health risks associated with exposure to disinfection by-products were weighed against the health benefits of disinfecting drinking water (attachment E). EPA researched the costs of implementing the rule and the benefits to health using a cost-of-illness approach (for details, see http://www.epa.gov/safewater/disinfection/stage2/basicinformation.html and also http://www.epa.gov/safewater/mdbp/qrg_st1.pdf). EPA established an MCL for total trihalomethanes that took into account the cost of disinfection, the potential cost of illnesses from untreated waters, and the concerns about health effects from disinfection by-products. Federal rules for public water supplies (called Stage 2 rules) that were established in 2006 are based on health considerations and are intended to minimize exposures to these disinfection by-products.

MDH found that the cost-benefit analyses conducted by EPA are complex and require specialized knowledge and data that are not readily available for Minnesota public water supply systems. For example, MDH does not have the staffing (there are no environmental health economics experts in the department) necessary to conduct an analysis that would be superior to

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[1] MDH has drafted HRL values that are higher than the corresponding MCLs when new toxicological data shows that the substance is less toxic than previously thought.

that performed by EPA. MDH would need to determine whether or not the four contaminants of concern had been found in Minnesota systems at concentrations between the HRL and MCL values. The number of systems in Minnesota and how many people served by those systems would need to be included in the analyses. The costs for Minnesota systems to comply with more stringent requirements might vary from the data used in the national analyses. Similarly, the health care costs might vary in Minnesota compared to the costs considered in the national analyses.

While the constraints described above make a cost-benefit analysis by MDH difficult at this time, an alternative approach would be for MDH to closely examine the analyses conducted by EPA and determine whether there are Minnesota-specific data that could be considered. Cost and benefit data are explicitly described by EPA in more recent evaluations and may help MDH decide how such information might be used in making decisions about regulating drinking water in Minnesota. MDH has considered the following steps for future work on understanding the public health benefits and the costs of implementing a value other than an MCL for public water supplies:

1. Ask EPA for the cost-benefit analyses that have been conducted on the four chemicals of interest to MDH.
2. Review EPA analyses to determine if factors specific or unique to Minnesota were or were not included in the analysis.
3. Search the literature for cost-benefit analyses conducted on the chemicals of interest by any other entities and review what is found.
4. Send EPA the MDH risk assessment that was used in the HRL calculation for the chemicals of interest and request comment on the differences in health benefits that result from using the data and assumptions from the HRL compared to the data and assumptions used to calculate the MCL.

While MDH does not have the resources to conduct an independent cost-benefit analysis for the four contaminants described above, MDH is interested in learning from and critically evaluating the work that is conducted by EPA. MDH will conduct the work outlined above should resources become available and priorities allow.

Sincerely,

John Linc Stine, Director
Environmental Health Division
P.O. Box 64975
St. Paul, MN 55164-0975

Attachments

Attachment A

"Water level standards" legislation

Minnesota Session Laws 2007 Chapter 147, Article 17, section 2

Complete text of the legislation is:

(a) Until the commissioner of health adopts rules setting the health risk limits required in paragraph (b), the health risk limit for all contaminants in private domestic wells must be the more stringent of the state standards or the federal standards determined by the United States Environmental Protection Agency.

(b) By March 1, 2008, the commissioner of health must publish in the State Register notice of intent to adopt rules relating to health risk limits for commonly detected contaminants. The commissioner of health shall review current scientific information to establish health risk limits for commonly detected contaminants in groundwater that provides a reasonable margin of safety to adequately protect the health of developing fetuses, infants, and children, in accordance with the requirements of Minnesota Statutes, section 144.0751. Nothing in paragraph (a) prohibits the commissioner from setting standards that are stricter than the federal standards.

(c) By March 1, 2009, the commissioner shall adopt rules relating to health risk limits for the ten most commonly detected contaminants.

(d) By February 1, 2008, the commissioner shall report to the legislature on the implications for public health and the costs to enforce the more stringent of health risk limits or maximum contaminant levels for public water systems.

Attachment B

New HRL values based on federal Maximum Contaminant Levels

Legislation passed in the 2007 regular session (Chapter 147, Article 17, section 2) establishes new Health Risk Limit (HRL) values for chemicals when the federal standard determined by the United States Environmental Protection Agency is more stringent than the 1993/1994 HRL value. The official notice appears in the Minnesota State Register, Monday 9 July 2007.

The Minnesota Department of Health compared the HRL values for chemicals in the 1993/1994 rule to the current Maximum Contaminant Levels (MCLs) from the U.S. Environmental Protection Agency and found that eleven HRL chemicals had a lower MCL value than a HRL value. As of July 1, 2007 the new HRL for these eleven chemicals is the MCL value. The eleven chemicals are shown below, along with the lowest of several draft 2008 values:

Chemical	1993/1994 HRL (ug/L)*	2007 HRL** (ug/L)	Draft 2008 HRL (ug/L)
Alachlor	4	2	5***
Atrazine	20	3	3
Benzene	10	5	2***
Bis(2-ethylhexyl)phthalate (Di(2-ethylhexyl)phthalate)	20	6	6
Dichloromethane	50	5	5
Pentachlorophenol	3	1	1
Simazine	30	4	4
Tetrachloroethylene	7	5	5
1,1,1-Trichloroethane	600	200	9,000***
Trichloroethylene	30	5	5
2(2,4,5-Trichlorophenoxy)propionic acid (2,4,5-TP) (Silvex)	60	50	50

* Units of micrograms contaminant per liter water (ug/L) are equivalent to parts per billion (ppb).

** As of July 1, 2007, the MCL value became the new HRL vale.

*** A new analysis was conducted that incorporated new information about intake values, sensitive life stages, and toxicity. The value shown is the lowest of the draft values for different life stages and endpoints.

Attachment C

Ten Common Ground Water Contaminants

In August 2007 representatives of ground water monitoring programs at the Minnesota Departments of Health and Agriculture and the Minnesota Pollution Control Agency identified 30 common contaminants for which HRLs should be developed. The agencies ranked the list according to how often the contaminants are found. Thirteen contaminants received a high ranking.

Chemical or Substance	HRL Status for 2008 Revision
High Rank (in alphabetical order)	
1,2-Dichloroethylene, cis-	MDH-derived value
Alachlor ESA	MDH-derived value
Atrazine	MCL-based HRL
Benzene	MDH-derived value
Deethylatrazine (degradate)	Use Atrazine HRL
Deisoproplyatrazine (degradate)	Use Atrazine HRL
Nitrate + Nitrite Nitrogen, Total	MCL-based HRL
Pentachlorophenol	MCL-based HRL
PFOA	MDH-derived value
PFOS	MDH-derived value
Tetrachloroethylene (PCE)	MCL-based HRL
Trichloroethylene (TCE)	MCL-based HRL
Vinyl Chloride	MDH-derived value
High/Medium Rank (in alphabetical order)	
1,3,5-Trimethylbenzene	MDH-derived value
Chloroform	MDH-derived value
Arsenic	
Benzo(a)pyrene	
Medium Rank (in alphabetical order)	
1,1-Dichloroethane	
1,1-Dichloroethene	
1,2,4-Trimethylbenzene	
1,2-Dichloroethylene, trans-	
Acetochlor ESA	
Chloroethane	
Dichlorodifluoromethane	
Dichlorofluoromethane	
Ethylene glycol	
Medium/Low Rank (in alphabetical order)	
Metolachlor ESA (degradate)	
Low Rank (in alphabetical order)	
Di (2-ethylhexyl) phthalate	MCL-based HRL
Ethyl ether	
Ethylbenzene	
Metribuzin degradate DADK	
Tetrahydrofuran	
Toluene	

Attachment D

Comparison of the 2008 draft HRL values and MCL values

Shaded rows contain a draft HRL value lower than the MCL value

	Chemical	1993/1994 HRL (ug/L*)	MCL (ug/L)	2008 Draft Chronic or Cancer HRL (ug/L)
1	Acetochlor	--	--	9
2	Alachlor	4	2**	5 ****
3	Alachlor ESA	--	--	20
4	Atrazine	20	3**	3
5	Benzene	10	5**	2
6	Chloroform	60	80	30
7	Cyanazine	--	--	1
8	Cis-1,2-Dichloroethylene	70	70	50
9	Dichloromethane (Methylene chloride)	50	5**	5
10	Dieldrin	--	--	0.006
11	Di(2-ethylhexyl)phthalate (DEHP)	20	6**	6
12	Nitrate (as N)	10,000	10,000	10,000
13	Pentachlorophenol	3	1**	1
14	Perfluorooctanoic Acid (PFOA) and Salts	--	--	0.3 ***
15	Perfluorooctane Sulfonate (PFOS) and Salts	--	--	0.3 ***
16	Simazine	30	4**	4
17	1,1,2,2-Tetrachloroethylene (PERC)	7	5**	5
18	1,1,1-Trichloroethane	600	200**	9,000 ****
19	1,1,2-Trichloroethylene (TCE)	30	5**	5
20	1,3,5-Trimethylbenzene	--	--	100
21	2-(2,4,5-Trichlorophenoxy) propionic acid	60	50**	50
22	Vinyl Chloride	0.2	2	0.2

* All values are in micrograms per liter of water (ug/L), which is the same as parts per billion (ppb)

** 2007 MCL-based HRL

*** PFOA 2007 HRL was 0.5 ug/L; PFOS 2007 HRL was 0.3 ug/L

**** EPA recently evaluated new toxicity data for 1,1,1-Trichloroethane (IRIS, 2006) and recommends a new reference dose that is 28-fold higher than the reference dose used in 1987 to create the MCL. EPA Office of Pesticides recently evaluated new data for alachlor (EPA Cancer Assessment Memorandum, 2004) and reclassified alachlor as a nonlinear carcinogen at low doses. The MDH therefore used a reference dose (noncancer) approach which resulted in a less stringent HRL than MCL.

Attachment E
Health Risk Management for Disinfection By-Products
Minnesota Department of Health
Drinking Water Protection Program
December 2007

Striking a balance between the treatment of water to make it safe for human consumption, and the potential side effects of that treatment has been a concern for water suppliers and regulators for many years. These concerns have led to regulations that attempt to balance the desirable and potential undesirable effects of treatment.

A case in point is disinfection and disinfection by-products. Disinfection of drinking water supplies represents one of the greatest public health achievements in history. Before U.S. cities began routinely disinfecting their drinking water supplies, cholera, typhoid fever, dysentery and hepatitis A killed thousands of residents every year. Where widely adopted, the combination of chlorine, filtration, and other water treatment practices have helped to virtually eliminate these diseases. However, in the 1970s scientists observed the formation of chlorinated organic materials in drinking water systems using chlorine and recognized the carcinogenic potential of these substances. Thus arose a need to balance the health benefits of disinfection to prevent waterborne disease outbreaks against the risk of cancer from long-term (chronic) exposure to disinfection byproducts (DBPs).

All chemical disinfectants produce organic and/or inorganic DBPs of potential health concern. All disinfectants oxidize naturally occurring organic and inorganic material in water, and this produces DBPs. Numerous water quality and treatment factors affect DBP formation. The rate and extent of DBP formation are higher as naturally occurring organic matter, bromide, temperature, disinfectant dose, and contact time with the disinfectant increase.

One method of DBP control is to remove natural organic matter prior to disinfection, using treatment processes such as optimized coagulation and filtration, which have been used by all surface water systems in Minnesota for the last 20 years, or by using innovated treatment technology such as membrane filtration and granular activated carbon (GAC) filters. These methods do not remove all organic matter, but can help reduce DBPs.

Another method utilities consider is the use of alternative disinfectants to chlorine, such as ozone, ultraviolet (UV) irradiation, chloramines, and chlorine dioxide. However, each of these options has unique DBP issues, such as bromate formation during ozonation, or the fact that UV irradiation does not provide residual disinfection capability in water distribution systems.

As regulations change, these and other technologies will be required in order to control DBP formation. However, DBPs will continue to be present in all waters containing chemical disinfectants.

In addition to the challenge of meeting disinfection needs and minimizing DBPs formations, there are potential unintended consequences that come with treatment process changes or modifications. One best-known example is the lead problem in Washington D.C. drinking water, which scientists believe was caused by a change in disinfection methods implemented to reduce DBP levels. The alternative disinfectant is believed to have increased the corrosivity of the water, resulting in lead leaching from pipes and into the water supplied to some homes. Another example occurred in International Falls, Minnesota in 1998, when the water system switched from using one coagulant aid to another, causing the water system to exceed the lead action level, even though the water system was maintaining an optimal corrosion control program for lead. Similar corrosion problems have been noted with the use of reverse osmosis, and radium and arsenic removal treatments.