

Phthalates and Drinking Water

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

What are phthalates?

Phthalates are chemicals added to polyvinyl chloride (PVC) plastics, paints, cosmetics, wood varnish, and medical supplies to increase flexibility and improve durability. Phthalates are found everywhere in the environment and have been found in food, drinking water, household dust, and indoor air.¹ Phthalate exposure can occur through ingestion, inhalation, and direct contact.¹ It is likely that children's mouthing, chewing and crawling behaviors result in greater exposure to phthalates than adults. Phthalates are used in large quantities in the United States, and studies of phthalates in urine show that almost everyone is exposed. BBP, DBP, and DEHP meet the definition of a Priority Chemical under the Toxic Free Kids Act.¹

Have BBP, DBP, or DEHP been found in Minnesota waters?

To date, BBP and DBP have not been detected in drinking water in Minnesota. BBP has been found at less than 1 part per billion (ppb) and DBP has been found at less than 10 ppb in other states.² There is little data on these phthalates in Minnesota waters. DEHP is infrequently found in Minnesota drinking water sources, typically at levels of 6 ppb or less.

What are MDH's water guidance values for these phthalates?

Based on new information, and accounting for endocrine (hormonal), reproductive, and developmental effects, MDH derived drinking water guidance values of 100 ppb for BBP and 20 ppb for DBP in 2012 and a value of 7 ppb for DEHP in 2013.³ A person drinking water at or below these levels, whether briefly, occasionally, or daily for a lifetime, would have little or no risk of health effects. There is a Maximum Contaminant Level (MCL) for DEHP of 6 ppb which the FDA also uses as a bottled water standard. This is slightly lower than the new guidance of 7 ppb for DEHP.

At a Glance

Phthalates are...

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



Phthalates enter your body from...

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

To reduce your exposure to phthalates^{4,6}...

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

BBP, DBP, and DEHP in drinking water are safe if...

- Levels are lower than the MDH guidance values of 100 ppb, 20 ppb, and 7 ppb respectively.

Can BBP, DBP, and DEHP in drinking water affect my health?

The levels of BBP, DBP, and DEHP found in drinking water are not likely to affect your health.

How are people exposed to BBP, DBP, and DEHP?

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

How do BBP, DBP, and DEHP get into the environment and how long do they stay in the environment?

These phthalates can be released during manufacturing of plastic products. Information from limited time periods indicates that releases in Minnesota were small and came from incineration or landfill disposal, and no releases to water were reported.⁹ Since many consumer products contain phthalates, household air and dust also contain phthalates and these products also end up in landfills. Household wastewater can contaminate surface water with phthalates.

BBP, DBP, and DEHP in the environment may break down over a period of days to weeks. These phthalates can form strong attachments to soil and sediment, so they do not tend to move rapidly into groundwater.

What are the potential environmental impacts?

These phthalates may be harmful to fish and other wildlife living in Minnesota lakes and streams. They may interfere with normal endocrine system function, reproduction, and development.

What Minnesotans Need to Know ...

Exposures from food, house dust, and consumer products are far greater than exposure from drinking water. For most people, these non-water exposures are below a level that would be a health concern. However, exposure to phthalates contributes to your cumulative exposure to all chemicals in the environment.

For more information contact:

Health Risk Assessment

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The Contaminants of Emerging Concern (CEC) Program...

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

Factors that determine if a chemical can affect your health are its potential to harm your body (its toxicity) and how much gets in your body (your exposure).

References

1. www.health.state.mn.us/divs/eh/hazardous/topics/toxfreekids/priority.html
2. Loraine G, et al. 2006. Seasonal variations in concentrations of pharmaceuticals and personal care products in drinking water and reclaimed wastewater in southern California. *Environ. Sci. Technol.* 40:687-695.
3. www.health.state.mn.us/divs/eh/risk/guidance/gw/butylbenzylsumm.pdf;
www.health.state.mn.us/divs/eh/risk/guidance/gw/dibutylphtsumm.pdf;
www.health.state.mn.us/divs/eh/risk/guidance/gw/diethylphtsumm.pdf
4. www.oeonline.org/our-work/healthier-lives/pollutioninpeople/solutions/phthalates
5. Clark K, et al. 2011. Modeling human exposure to phthalate esters: a comparison of indirect and biomonitoring estimation methods. *Human and Ecological Risk Assessment* 17:923-965.
6. U.S. Department of Health and Human Services. 2003. NTP-CERHR monograph on the potential human reproductive and developmental effects of butyl benzyl phthalate (BBP). NIH Publication No. 03-4487.
http://cerhr.niehs.nih.gov/evals/phthalates/b-b-phthalate/BBP_Monograph_Final.pdf
7. www.cpesc.gov/cpscpub/prerel/prhtml09/09130.html
8. www.cdc.gov/exposurereport/pdf/FourthReport.pdf
9. www.epa.gov/triexplorer/trends.htm