

# Nonylphenols and Water

## Nonylphenols

Nonylphenols exist as a mixture of closely related chemicals. Nonylphenols are used to manufacture nonylphenol ethoxylates (NPEs). NPEs are widely used in commercial and household cleaning products, industrial processing, and in many consumer products such as fabrics, shoes, paints and coatings, personal care products like lotions and liquid cosmetics, and lawn care and crop protection products.<sup>1</sup> When NPEs are released into the environment they break down to nonylphenols.<sup>1,2</sup>

## Nonylphenols in Minnesota Waters

Nonylphenols have been found frequently in treated wastewater in Minnesota (80% of samples) at low levels, typically below 1 µg/L\*. In surface water, nonylphenols are somewhat common (23% of samples) at levels that are typically below 0.5 µg/L, with a small number of detections up to 3 µg/L.<sup>3</sup>

In Minnesota groundwater, there are a few known detections of nonylphenols. The MDH-US Geological Survey (USGS) database lists 12 detections out of 299 records. Nine of these detections indicated the chemical was present, but not quantified, and the other three were estimated values. (This is common when the chemical is present at low levels that are just barely within the range of detection.) Two additional detections are listed in the USGS-EPA Water Quality Portal at 1 and 2 µg/L. The Minnesota Pollution Control Agency (MPCA) reported in 2019 that 10 percent of samples of ambient groundwater contained nonylphenols, with all detections within the applicable human health limits set by the EPA and MDH.<sup>4</sup>

There is one known detection of nonylphenols in finished drinking water in Minnesota, in a sample collected in 2001 with an estimated concentration of 1.5 µg/L. This is lower than the health-based guidance value developed by MDH.<sup>5</sup>

\*One microgram per liter (µg/L) is the same as one part per billion (ppb).

## MDH Guidance Value

Based on available information, MDH developed a guidance value of 20 ppb for nonylphenols. MDH does not use guidance values to regulate water quality, but they may be useful for situations in which no regulations exist. MDH develops guidance values to protect people who are most vulnerable to the potentially harmful effects of a contaminant. A person drinking water at or below the guidance value would have little or no risk of health effects.

## Potential Health Effects

Drinking water that has nonylphenols at levels higher than the guidance value may cause adverse health effects. Animal studies have indicated that exposure to nonylphenols can affect kidneys over time. At higher doses, adverse developmental effects occurred including decreased weight and changes to the timing of milestones during puberty.

## Potential Exposure to Nonylphenols

You can be exposed to nonylphenols by using personal care products that contain NPEs. Products that remain on the skin for a period of time (lotions, face creams, and liquid cosmetics) result in a higher exposure than those that are washed off quickly during use (soaps and shampoos). You might also be exposed to nonylphenols by eating foods that are packaged in material that contains NPEs. An infant may be exposed nonylphenols through breastmilk. Overall exposures from all of these sources are well below harmful levels based on the current assessment.<sup>5</sup>

## Nonylphenols in the Environment

Nonylphenols are a breakdown product of NPEs. Nonylphenols enter the environment when products containing nonylphenols or NPEs are applied to lawns and crops or disposed of into wastewater (shampoos, detergents) or into landfills. Wastewater treatment processes can remove most NPEs from wastewater, but some amount persists after treatment and is discharged into the environment, where it breaks down to nonylphenols. Wastewater treatment discharges are continually releasing nonylphenols and NPEs into rivers and streams.

## Potential Environmental Impacts of Nonylphenols

Once in water, nonylphenols adhere strongly to soil and sediment. It takes weeks to months for nonylphenols to break down in the environment.

Nonylphenols are harmful to fish and other aquatic animals and plants. Nonylphenols disrupt the normal endocrine function of fish at low levels in the aquatic environment. The United States Environmental Protection Agency has developed criteria for nonylphenols to assist states in developing water quality standards to protect aquatic life from this chemical.

## Health Risk Assessment Unit

The MDH Health Risk Assessment Unit evaluates the health risks from contaminants in drinking water sources and develops health-based guidance values for drinking water. MDH works in collaboration with the MPCA and the Minnesota Department of Agriculture to understand the occurrence and environmental effects of contaminants in water.

## References

1. Federal Register. Vol 79, No. 190. October 1, 2014. Retrieved from <https://www.gpo.gov/fdsys/pkg/FR-2014-10-01/pdf/2014-23253.pdf>
2. Minnesota Pollution Control Agency (MPCA). (2010). [DRAFT] Aquatic Life Water Quality Standards Technical Support Document for Nonylphenol and Ethoxylates. Retrieved from <https://www.pca.state.mn.us/index.php/view-document.html?gid=14925>.
3. USGS-EPA Water Quality Portal. 2022. <https://www.waterqualitydata.us/>.
4. MPCA. 2019. The Condition of Minnesota's Groundwater Quality, 2013-2017. Retrieved from <https://www.pca.state.mn.us/sites/default/files/wq-am1-10.pdf>.
5. Lee, K., Barber, L. B., Furlong, E. T., Cahill, J. D., Kolpin, D. W., Meyer, M. T., & Zaugg, S. D. (2004). Presence and distribution of organic wastewater compounds in wastewater, surface, ground, and drinking waters, Minnesota, 2000-02 (Scientific Investigation Report 2004-5138). US Geological Survey. <https://pubs.usgs.gov/sir/2004/5138/>

Minnesota Department of Health  
Health Risk Assessment Unit  
[health.risk@state.mn.us](mailto:health.risk@state.mn.us)  
[www.health.state.mn.us/](http://www.health.state.mn.us/)



JUNE 2022

*To obtain this information in a different format, call: 651-201-4899.*