

## Nanosilver Screening Profile

*Nanosilver is a chemical that may be present in potential drinking water sources in Minnesota. The information in this profile was collected for the screening process of the Minnesota Department of Health's Contaminants of Emerging Concern (CEC) program in February 2017. The chemicals nominated to the CEC program are screened and ranked based on their toxicity and presence in Minnesota waters. Based on these rankings, some chemicals are selected for a full review. CEC program staff have not selected nanosilver for a full review.*

### Nanosilver Uses

Nanosilver is used in a variety of industrial, pharmaceutical, medical, and consumer products. A nanoparticle is a very small particle between 1-100 nanometers in size. Nanosilver is made up of silver nanoparticles. These particles serve as antibacterial and antifungal agents for industrial purposes, in water treatment, and in consumer products (such as clothing, cosmetics, childcare items, food containers, and many others). Nanosilver is also used in some filters to purify groundwater.

The U.S. Food and Drug Administration (FDA) allows nanosilver in some products that have contact with food. The FDA is still actively researching whether food contact uses pose a safety concern.<sup>1</sup>

### Nanosilver in the Environment

Nanosilver likely enters the environment through wastewater when people use or wash consumer products containing nanosilver. Nanosilver may also enter the environment after products containing nanosilver are disposed of in landfills.

Nanosilver is not currently being monitored for in Minnesota waters. Studies from outside Minnesota suggest that treated wastewater may have low levels of silver.<sup>2</sup> Nanosilver has the potential to build up in the tissues of fish and wildlife.<sup>3</sup>

### Exposure to Nanosilver

Exposure to nanosilver may occur through ingestion of products containing nanosilver or contaminated food or water. Exposure may also occur through skin contact with products containing nanosilver.

### Potential Health Effects

Excess exposure to nanosilver may cause argyria--a permanent condition that causes the skin to turn a

blue or grey color. Animal studies show that exposure to high levels of nanosilver over a long time can damage the liver and build up in the liver, kidneys, and brain.<sup>4,5</sup> A recent study conducted with rats suggests that nanosilver can cross the placenta and build up in rat pups.<sup>6</sup>

Based on the screening assessment, a full review of nanosilver may be possible; however, it is ranked lower than other nominated CEC chemicals at this time.

### References

1. FDA. 2012. [Center for Food Safety and Applied Nutrition Nanotechnology Programs](http://www.fda.gov/ScienceResearch/SpecialTopics/Nanotechnology/ucm309681.htm) (<http://www.fda.gov/ScienceResearch/SpecialTopics/Nanotechnology/ucm309681.htm>)
2. Johnson AC, et al. 2014. Particulate and colloidal silver in sewage effluent and sludge discharged from British wastewater treatment plants. *Chemosphere* 112:49-55.
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4. Kim YS, et al. 2010. Subchronic oral toxicity of silver nanoparticles. *Particle and Fibre Toxicology* 7(1): 20.
5. van der Zande M, et al. 2012. Distribution, elimination, and toxicity of silver nanoparticles and silver ions in rats after 28-day oral exposure. *ACS Nano* 6(8): 7427-7442.
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For more information, contact:  
Minnesota Department of Health Environmental Health Division  
Contaminants of Emerging Concern Program  
[health.legacy@state.mn.us](mailto:health.legacy@state.mn.us)  
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# Contaminants of Emerging Concern Program

## Chemical Review Process

The Contaminants of Emerging Concern (CEC) program investigates the potential health concerns of contaminants of emerging concern in drinking water. This investigation includes a rapid assessment ('screening') to prioritize nominated chemicals for in-depth research and evaluation that result in drinking water guidance and information about exposure.

## Chemical Nomination and Eligibility

Minnesota risk managers, stakeholders, and the public are encouraged to nominate contaminants for review. After chemicals are nominated, MDH program staff determine eligibility by examining the likelihood that the chemical will enter Minnesota waters and whether adequate guidance already exists.

## Screening and Risk Based Selection

Program staff conduct a screening of where and how a contaminant is used in the state, its potential to enter the water supply, and its potential to harm humans. The results from the screening are used to prioritize nominated chemicals.

Chemicals having higher exposure and harm potential are selected for in-depth review and development of guidance (a contaminant water concentration that is not harmful to people). Chemicals that rank lower remain candidates for future in-depth review. For some contaminants, however, the information is too limited. For chemicals that are not selected for in-depth review, the results of the screening assessment are summarized in a Screening Profile. The screening and prioritization process is repeated as additional chemicals are nominated and screened.

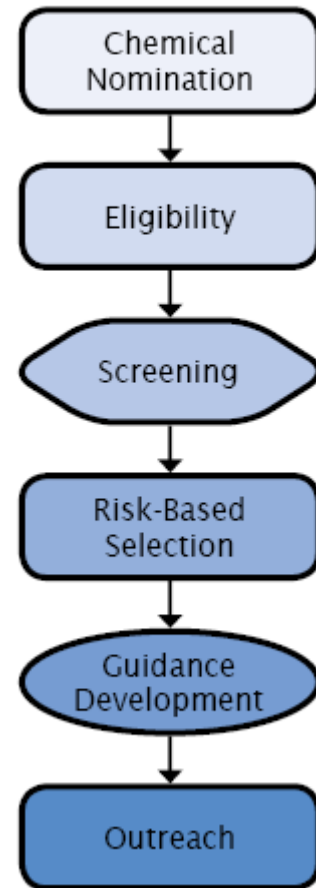
## Guidance Development

When a chemical is selected for a full review, program staff carefully review exposure and toxicological information to understand how humans may be exposed and what adverse health effects occur from exposure. Staff combine the results of in-depth analyses of toxicity and exposure to calculate a guidance, a level of contaminant in water that causes little to no harm to someone drinking the water.

## Outreach

CEC program staff work to communicate the results of the chemical review process. This includes making key findings publicly available on web pages and at a variety of meetings and events. An email subscription service (GovDelivery) is also used to alert the interested public (subscribers) of chemical review activities and guidance values.

## Chemical Review Process



Subscribe to the CEC Program GovDelivery service to receive notification when reviews are initiated for water contaminants and other announcements by visiting: <http://www.health.state.mn.us/cec>