



MVSD • YOUR COMMUNITY WATER SUPPLY
Member Cities: Youngstown and Niles

December 10, 2019

MVSD Taste and Smell Issues

Factsheet: Geosmin & MIB

Taste and smell issues experienced in drinking water are associated with Geosmin and MIB. Geosmin is an organic compound with a distinct earthy flavor and aroma, and is responsible for the earthy taste. It is produced by a variety of microorganisms.

2-Methylisoborneol (MIB) is an organic chemical with a strong odor. Its odor detection threshold is very low and it is one of the chemicals with major influence on the quality of drinking water. Some algae, particularly blue-green algae (cyanobacteria) such as Anabaena, produce MIB together with other odorous chemicals such as geosmin.[1] They give a musty or earthy odor that can be quite strong if an algal bloom is present.

When the cyanobacteria breaks down, it will release MIB that is trapped in the cells. These chemicals can be smelled at very low levels, in the parts-per-trillion range (ppt range), and are responsible for many "taste and smell"

Frequently Asked Questions (FAQ)

What is causing the taste and smell experienced by some customers served by MVSD?

Recent test results, from a private, third party accredited laboratory, confirm the presence of geosmin and/or MIB, a naturally occurring compound found in surface waters (ie. lakes, rivers, streams, and dams).

What is geosmin & MIB?

Geosmin is a naturally occurring compound produced by bacteria in soil and algae found in surface water. Geosmin produces the odor of overturned rich soils and is present in foods such as beets, spinach, and mushrooms. Geosmin and MIB (2-Methyl-iso-Borneol) are naturally occurring compounds found in surface waters (rivers and dams) as organic molecules produced by blue-green algae. Bright sun, warm temperatures and nutrients result in ideal growing conditions for the algae. The compounds are produced inside the algae cells and are only released when the algae die.

Why does it occur?

Apart from the sunlight and raised temperatures, algae require nutrients to grow and some of the reservoirs have suffered from upstream negative environmental impacts that have raised the nutrient levels, which support these algal blooms. The Meander Reservoir experienced a period of above normal temperatures in the late fall. A recent cold spell rapidly lowered the water temperature and the recent warm temperatures have caused natural turnover of the water. This turnover has mixed dead



MVSD • YOUR COMMUNITY WATER SUPPLY
Member Cities: Youngstown and Niles

algae and other contaminants in the source water that the MVSD uses to treat for drinking water to its customers.

Where is the smell and taste occurring?

There are reports of an earthy, musty-type smell/taste in the water coming from a variety of areas served by the City of Youngstown and Niles, customers of the MVSD. There is no specific area that is targeted by this water, but could possibly be in areas of the distribution system with low turnover of its water.

Is the water quality affected?

While the taste and smell can be unpleasant, geosmin and MIB are *not toxic or harmful*. The *water remains safe to drink*. On-going testing continues to show an absence of harmful bacteria and other pathogens in the water.

How long will the taste and smell last?

It is impossible to predict the onset of an incidence of geosmin, or how long it will last. Geosmin compounds have been shown to remain in lakes and reservoirs for days to months. The MVSD has recently invested in technology and equipment that will help us identify types of algae and other contaminants on a more frequent basis to help address this issue.

Can the taste and smell be reduced at the tap?

To make the water taste better, try chilling it, adding ice cubes, a slice of lemon, or a few drops of lemon juice. Geosmin and MIB can be eliminated by colder temperatures and by a decrease in the pH of water.

What does it smell like?

Geosmin and MIB typically produces an earthy or musty smell as is found in the odor of overturned rich soils, and is present in some foods such as beets, spinach, and mushrooms.

Why do we smell it?

The human nose is extremely sensitive to geosmin. The general threshold for human detection is about 20 to 30 ng/l (20 nanograms per litre = 20 parts per trillion). A basic analogy is 20 to 30 pennies out of a billion dollars to get an understanding of the concentration of the compounds in the water. However, people with sensitive palate can detect these compounds in drinking water when the concentration is as low as 5 ng/l. Heating the water increases the volatility of these compounds, which explains why the smell is more easily detected when you are in the shower or when used for hot beverages.

How does MVSD detect it?

Although the MVSD monitors the water and conducts its own testing, we rely on customers to contact us to inform us of changes in their water with respect to taste and smell. Test and smell is not a primary standard that the MVSD is required to monitor, though we do perform some testing to ensure the highest quality of water. Our lab technicians have different noses and tastes than the customers, so if they are not tasting and smelling unpleasant water, that doesn't mean that you the customer is not. MVSD has engaged a private, third party accredited laboratory to provide on-going testing for



MVSD • YOUR COMMUNITY WATER SUPPLY
Member Cities: Youngstown and Niles

geosmin and MIB in its raw/source water and in the finished water. MVSD continues to follow a rigorous protocol of regular monitoring of both the raw and treated waters across our service area. On-going in house testing continues to show an absence of harmful bacteria and other pathogens in the water that is being provided to you, the customer. *The water remains safe to drink.*

Can it be removed from the drinking water?

There are several proven treatment technologies for removing geosmin from drinking water including granular or powdered activated carbon in certain applications; oxidation with ozone or advanced oxidation processes (AOPs); bio filtration; or some combination of each. The actual technology used at a specific plant is highly dependent on the chemistry of the source water. Any engineered treatment solution must first be evaluated to ensure the installation of a system to treat geosmin and MIB does not negatively impact the current treatment processes. Cost can be a prohibiting factor for smaller water systems as some of these treatments can have multi-million-dollar price tags.

The MVSD uses a combination of potassium permanganate to oxidize harmful bacteria and algae coming into the plant, powdered activated carbon (PAC) to capture these materials and remove them during the treatment and filtration process and chlorine to ensure all bacteria and harmful materials are removed before we send the water to our customers. The MVSD has changed their chemical process within our plant to utilize more carbon, as this has been found to be effective in removing geosmin and MIB from drinking water. We have also procured higher quality carbon to use during this time to help remove a larger percentage of geosmin and MIB from our process. We anticipate that these changes will help address the taste and smell issues.

Does geosmin and MIB occur elsewhere?

Geosmin and MIB is common in many jurisdictions across the United States, and elsewhere in the world. Here locally, there are many water systems facing the same issues that CEW&SA is facing.

Will MVSD be investing in treatment processes to remove geosmin?

As always, the health and safety of customers will be foremost. MVSD has consulted with the Ohio EPA, Engineering Consultants, Equipment Manufacturers as well as other Water Systems and Chemical Companies. The MVSD will continue reviewing all the research available in an effort to identify future infrastructure investments to improve water quality including taste and smell control.

James W. Jones, Jr., P.E., CCM
Chief Engineer, MVSD