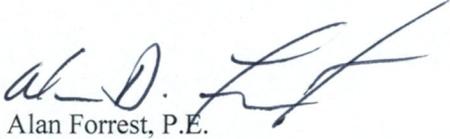




MEMORANDUM

DATE: April 22, 2015

TO: Technical Planning and Policy Subcommittee

FROM: 
Alan Forrest, P.E.
Director, Tucson Water

SUBJECT: Questions Regarding Water Quality Presentations

At the March 25th Technical Planning and Policy (TPP) Subcommittee meeting two questions were posed to Tucson Water staff, regarding the of presence of an ameba known as *Naegleria fowleri* (*N. fowleri*) in the water supply, as well as that of the presence of Hexavalent Chromium (chrome-6) in water treated at the Advanced Oxidation Process (AOP) treatment facility. We would like to take this opportunity to respond to these concerns.

The CDC reports that *N. fowleri* is an ameba that is most frequently found in warm or hot freshwater such as lakes, rivers and hot springs. *N. fowleri* infections are rare, 34 cases in a 10 year period in the United States, and can only be transmitted through exposure to the nasal cavities. Infections **cannot** be transmitted through drinking contaminated water. The infectious form of *N. fowleri* is sensitive to chlorine disinfection, and a chlorine concentration of 1 ppm will reduce the number of viable ameba by 99.99%, while a chlorine residual of .5 mg/l is known to control the ameba. Of the 34 cases, 30 were related to recreational water use and 3 were related to under-chlorinated tap water.

A recent presentation to TPP reported on the positive occurrence of *N. fowleri* in recreational water sites in Arizona (12.6%), non-chlorinated well water in Arizona (10.6%), and the Tucson Water potable distribution system (1%). As expected, samples from recreational water sites and unchlorinated water were more frequently positive for *N. fowleri*. Tucson Water maintains a concentration range of .8-1 ppm chlorine in its main potable water system and 1-1.2 ppm in its isolated systems. This level of concentration is known to effectively control the presence of *N. fowleri*.

According to the EPA, Chrome-6 occurs naturally in the environment from the erosion of natural chromium deposits but it can also be produced by industrial processes. There are demonstrated instances of chromium being released to the environment by leakage, poor storage, or inadequate industrial waste disposal practices. The EPA has an enforceable drinking water standard of 0.1 milligrams per liter (mg/L) for total chromium, which includes chromium-6 and chromium-3.

A recent discussion during a presentation at a TPP meeting suggested that the treatment process at the AOP may result in the creation of chrome-6. In response to this discussion, Tucson Water had special influent and effluent samples of AOP treated water taken. These samples were independently tested, and results were reviewed by Tucson Water's lab manager. Chrome-6 and total chromium influent and effluent levels indicate that the treatment process does not affect the level of chrome-6 or total chromium present in the treated water. The AOP facility was neither designed nor intended to treat chrome-6 or total chromium, the pre and post treatment levels of chrome-6 and total chromium reflect that chrome-6 and total chromium are **not** created by the treatment process.

Tucson Water is vigilant in monitoring our water quality and takes all concerns regarding water quality very seriously. Our disinfection and monitoring methods ensure compliance with all water quality standards and result in the highest water quality for our customers.

Facts About *Naegleria fowleri* and Primary Amebic Meningoencephalitis

Naegleria fowleri is found around the world, often in warm or hot freshwater (lakes, rivers, and hot springs).

Naegleria fowleri infections are rare and devastating. From 2004 to 2013, 34 infections were reported in the U.S. All but two were fatal.

- *Naegleria fowleri* is a warm water-loving amoeba found around the world, often in warm or hot freshwater (lakes, rivers, and hot springs).
- *Naegleria fowleri* amoeba can travel up the nose and into the brain. This causes the disease primary amebic meningoencephalitis (PAM), which destroys brain tissue and causes brain swelling and death.
- Of 132 people known to be infected in the U.S. since 1962, only three people survived.

Symptoms

Symptoms can be mild at first, but they worsen quickly.

- Usually start about 5 days after infection (but can range from 1–7 days)
- Can include headache, fever, nausea, or vomiting
- Later symptoms can include stiff neck, confusion, lack of attention to people and surroundings, loss of balance, seizures, and hallucinations
- After symptoms start, the disease causes death within about 5 days (but can range from 1–12 days)

You cannot be infected with *Naegleria fowleri* by drinking contaminated water, and the infection cannot spread from one person to another.



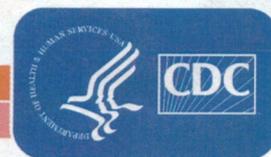
Spread

Infections are spread through the nose.

People are infected when water containing the amoeba enters the body through the nose. Recreational water-associated infection most often occurs when people go swimming or diving during the summer in warm freshwater places, like lakes and rivers. Sometimes infections occur after people put their head under water in hot springs.

Infection has also happened when people use contaminated drinking water to cleanse their nasal passages during religious practices, use a neti pot or other device to rinse their sinuses through the nose, or get the contaminated water up their nose during recreational play.

National Center for Emerging and Zoonotic Infectious Diseases
Division of Foodborne, Waterborne, and Environmental Diseases



Naegleria fowleri
is not found in salt
water, like the ocean.

People and Places

Naegleria fowleri infections are more common in young boys and after use of warm lakes, rivers, and hot springs.

Young boys are most at risk for *Naegleria fowleri* infection. While the reasons are unclear, young boys might participate in more water activities like diving and playing in the sediment at the bottom of lakes and rivers.

In the U.S., most infections have come from freshwater lakes, rivers, and hot springs located in southern-tier states. Recently people have become infected in northern states following periods of very warm temperatures.

The amoeba can be found in:

- Bodies of warm freshwater, like lakes and rivers
- Geothermal (naturally hot) water, like hot springs, and drinking water sources (from water going up the nose)
- Warm water discharge from industrial plants

Recreational water-associated infections occur most often in July, August, and September, when temperatures are high for prolonged periods of time, causing water temperatures to rise and water levels to decrease.

Protect Yourself

Lower your risk when swimming and rinsing your sinuses.

We do not know how to lower natural *Naegleria fowleri* levels in lakes and rivers. People should assume that there is always a low level of risk of *Naegleria fowleri* infection whenever they enter warm freshwater lakes, rivers, and hot springs, especially in southern-tier states.

The only certain way to prevent an infection when swimming is to avoid water-related activities in warm freshwater.

If you choose to swim, limit the amount of water going up the nose, and avoid water where *Naegleria fowleri* might live.

- Hold your nose shut, use nose clips, or keep your head above water when taking part in water-related activities in bodies of warm freshwater, including activities in warm water discharged from industrial plants.
- Avoid putting your head under water in hot springs and other untreated geothermal waters.
- Avoid water-related activities in warm freshwater during periods of high water temperatures and low water levels.
- Avoid digging in, or stirring up, the sediment while taking part in water-related activities in shallow, warm freshwater areas.

Rinsing sinuses, including with neti pots

When making a solution for irrigating, flushing, or rinsing your sinuses (for example, when using a neti pot, sinus rinse bottle, or other irrigation device, or performing ritual nasal rinsing), use safe water to protect yourself.

Take at least one of these actions to lower your risk of becoming infected:



- **Boil:** Use water that has been previously boiled for 1 minute and left to cool.
 - » At elevations above 6,500 feet, boil for 3 minutes.
- **Filter:** Use a filter designed to remove some water-loving germs.
 - » The label may read “NSF 53” or “NSF 58.”
 - » Filter labels that read “absolute pore size of 1 micron or smaller” are also effective.
- **Buy:** Use water with a label specifying that it contains distilled or sterile water.
- **Disinfect:** Learn how to disinfect your water to ensure it is safe from *Naegleria fowleri*.
 - » Chlorine bleach used at the right level and time will work as a disinfectant against this germ.

Rinse the irrigation device after each use with safe water, and leave the device open to air dry completely.



www.cdc.gov/naegleria