

## References

Kogevinas M, Bustamante M, Gracia-Lavedán E, Ballester F, Cordier S, Costet N, Espinosa A, Grazuleviciene R, Danileviciute A, Ibarluzea J, Karadanelli M, Krasner S, Patelarou E, Stephanou E, Tardón A, Toledano MB, Wright J, Villanueva CM, Nieuwenhuijsen M. Drinking Water Disinfection By-products, Genetic Polymorphisms, and Birth Outcomes in a European Mother-Child Cohort Study. *Epidemiology*. 2016 Nov;27(6):903-11.

Reif JS, Hatch MC, Bracken M, Holmes LB, Schwetz BA, Singer PC. Reproductive and developmental effects of disinfection by-products in drinking water. *Environ Health Perspect*. 1996 Oct;104(10):1056-61.

Savitz DA, Singer PC, Herring AH, Hartmann KE, Weinberg HS, Makarushka C. Exposure to drinking water disinfection by-products and pregnancy loss. *Am J Epidemiol*. 2006 Dec 1;164(11):1043-51.

Naldi L, Cazzaniga S, Gonçalo M, Diepgen T, Bruze M, Elsner P, Coenraads PJ, Svensson Å, Bertuccio P, Ofenloch R; EDEN Fragrance Study Group. Prevalence of self-reported skin complaints and avoidance of common daily life consumer products in selected European Regions. *JAMA Dermatol*. 2014 Feb;150(2):154-63.

However, these studies were conducted using DBP concentrations far greater than those found in drinking water.

Experts agree that this research on DBPs and health effects is preliminary and inconclusive, so research is ongoing.

### Conclusion:

In concurrence with the United States Environmental Protection Agency, the Texas Commission on Environmental Quality, and the North Texas Municipal Water District, and based on my expertise as a physician and toxicologist, the public water supply is safe for animal and human consumption.

North Texas Municipal Water District follows standard industry practices to treat, test, maintain and provide safe, clean water suitable for all uses for both people and pets. While taste is a personal preference, there is no medical reason needed for filtration or further treatment of the water.

# MEDICAL FACTS

## About North Texas Municipal Water District Water

NTMWD engaged a medical toxicologist, Dr. Scott Phillips, to evaluate claims made about the safety of the water we treat and deliver. There have been assertions made regarding water safety and health impacts. We wanted to research the validity of these claims to ensure our water is safe, and to reassure our customers through factual, science based information. The following information was researched and provided by Dr. Phillips, whose academic and professional credentials are listed below.

### Need for Disinfection

According to the World Health Organization, untreated water causes 1.5 million deaths worldwide annually. However, in the U.S. and other developed nations, over the last 100 years — and for the first time in recorded history — life expectancy of millions of people has doubled because of water sanitation. Clean water saves lives. The risks of waterborne pathogens such as bacteria causing deadly cholera or botulism or the fatal polyomavirus that infects the brain are far more dangerous than the byproducts of the disinfection process.

NTMWD uses ozone, chlorine and chloramine (chlorine + ammonia) to purify water by eliminating waterborne pathogens: bacteria, parasites and viruses. Scores of water facilities throughout the United States and other developed nations all employ this same disinfection process to produce clean water.

### Scott Phillips, MD

*Scott Phillips, MD, FACP, FACMT, FAACT is a medical doctor whose specialty is medical toxicology. He prepared this fact sheet to address health-related allegations that may be of interest to residents served by the NTMWD. Dr. Phillips is an associate clinical professor of medicine in the Division of Pharmacology and Toxicology, Department of Medicine at the University of Colorado. Dr. Phillips has authored several textbooks on occupational and environmental toxicology. He also is an attending physician at several hospitals, and the Rocky Mountain Poison and Drug Center and the Washington Poison Center.*

Trihalomethanes (THMs) or disinfection byproducts (DBP) created through the disinfection process are regulated by the US Environmental Protection Agency (EPA). THMs are a group of compounds that form when chlorine and chloramine react with organic matter, such as decaying plant material, present in source water. Surface waters, like lakes and rivers, may be especially high in organic matter because of plants and animals living in or near the water. The EPA regulates THMs at a maximum annual average of 80 parts per billion. Tests results indicate NTMWD complies with the EPA limits. Moreover, both an independent laboratory and the Texas Commission on Environmental Quality (TCEQ), the agency responsible for ensuring water system compliance, report that NTMWD maintains water systems containing THM of less than

80 ppb. One part per billion is the equivalent of one drop in an Olympic-sized swimming pool.

## DBPs and Miscarriages

Allegations that the disinfection byproducts in drinking water are associated with miscarriages have no scientific foundation. Numerous rigorous scientific studies that have questioned this show no increase in miscarriages related to water disinfection practices. Following are excerpts from these studies, full copies are available through NTMWD:

### **Drinking Water Disinfection Byproducts, Genetic Polymorphisms, and Birth Outcomes in a European Mother-Child Cohort Study, Kogevinas 2018**

*"We examined the association between exposure during pregnancy to trihalomethanes, the most common water disinfection by-products, and birth outcomes in a European cohort study. We took into account exposure through different water uses, measures of water toxicity, and genetic susceptibility. In this large European **study we found no association between birth outcomes and trihalomethane exposures during pregnancy** in the total population or in potentially genetically susceptible subgroups."*

### **Exposure to Drinking Water Disinfection By-Products and Pregnancy Loss, Savitz 2006, Published in American Journal of Epidemiology**

*"Pregnancy loss was not associated with high personal THM exposure ( 75 l g/liter and 5 glasses of water/day) (odds ratio . 1.1, 95 percent confidence interval: 0.7, 1.7). Overall, there was notably less support for an association between THM exposure and pregnancy loss compared with the earlier study."*

### **Reproductive and Developmental Effects of Disinfection Byproducts in Drinking Water, Reif, 1996**

*"Epidemiologic understanding of exposure disease relationships generally evolves through an iterative process in which successive studies attempt to extend and improve upon earlier reports. Epidemiologic research on DBPs in drinking water and reproductive effects is at a very early stage, and it is not surprising to find that the studies conducted to date employed relatively inexpensive, expedient methods. Early stage studies often rely on available data rather than on gathering new information or*

*undertaking individual exposure assessment. As a result, data on important variables may be poorly measured or lacking entirely. Small increases in risk may be due to chance, confounding, or bias.*

*There is little question that water disinfection is desirable, and, as yet, there is no indication that alternatives to chlorination are themselves without potential risk. The currently available human studies on effects of chlorination by-products provide an inadequate basis for identifying DBPs as a reproductive or developmental hazard. Nevertheless, additional laboratory animal and epidemiologic research should be conducted, employing a coordinated multidisciplinary approach."*

The assertions made about increased risk of miscarriages based on the DBPs found in NTMWD drinking water are based on correlation of women drinking tap water, but do not show this was the cause. The studies indicate drinking water did not cause miscarriages.

## Skin Rashes

Skin rashes are one of the most common maladies reported in health surveys. Skin rashes have been estimated to occur in as many as one in five people (Naldi 2014) and occur from diverse causes including allergens, heat, low or high humidity, medications, and certain illnesses. Skin rashes are areas of skin, which may become swollen, inflamed, or irritated and can include skin bumps; blotchy, scaly or red skin; and itchy or burning skin. Some skin rashes occur right away, while others take some time to develop.

While rashes are common, they have not been linked to drinking water treated with chlorine or disinfection byproducts (DBPs) by regulatory agencies or epidemiological studies (<http://dwi.defra.gov.uk/research/completed-research/reports/dwi70-2-257.pdf>).

There have been no scientific studies suggesting an association between psoriasis and chlorine. If you are experiencing a rash that you are concerned about, you should discuss the matter with your dermatologist.

## Additional Research on DBPs

Animal research has shown that exposure to high concentrations of DBPs can increase the risk of cancer. There is particular concern about bladder cancer.

## Additional Resources

### **Environmental Protection Agency (EPA)**

[www.epa.gov/dwreginfo/chloramines-drinking-water](http://www.epa.gov/dwreginfo/chloramines-drinking-water)

### **Texas Commission on Environmental Quality (TCEQ)**

[www.tceq.texas.gov/drinkingwater](http://www.tceq.texas.gov/drinkingwater)

### **Centers for Disease Control and Prevention (CDC)**

[www.cdc.gov/healthywater/drinking/public/water\\_disinfection.html](http://www.cdc.gov/healthywater/drinking/public/water_disinfection.html)

### **American Water Works Association (AWWA)**

[www.drinktap.org/Water-Info/Whats-in-My-Water/Disinfection-Byproducts](http://www.drinktap.org/Water-Info/Whats-in-My-Water/Disinfection-Byproducts)

### **NTMWD, City and Industry**

[www.SafeWaterNorthTexas.com](http://www.SafeWaterNorthTexas.com)