

TTHMs and HAA5s Q2 Violation

Informational Packet

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What are TTHMs and HAA5s?

Total Trihalomethanes, or TTHMs, and Haloacetic Acids, or HAA5s, are common disinfection byproducts, or DBPs, caused when Chlorine interacts with Organics (measured as Total Organic Carbon, or TOC). For compliance reasons, TTHMs have a max contaminant level, or MCL, of 80 parts per billion; and HAA5s have an MCL of 60 parts per billion. According to the EPD, some people who drink water containing TTHMs in excess of the MCL over **many years** may experience problems with their liver, kidneys, or central nervous system, and may have an increased risk of getting cancer. Also, per the EPD, some people who drink water containing HAA5s in excess of the MCL over **many years** may have an increased risk of getting cancer.

How are TTHMs and HAA5s monitored?

Every quarter, the EPD sends us a sample kit that we take to 4 locations: Oak Grove at Aqua Taba, the corner of Tom's Creek Road and Avalon Road, the cemetery near the corner of Hwy 184 and Hwy 105, and the corner of Dick's Hill Parkway and Ayersville Road. The results of those samples are then averaged together with the results of the previous 3 quarters. This is done individually for each location, and this number gives us our Locational Running Annual Average, or LRAA. If the LRAA for any location goes above the MCL, then we are in violation.

What Caused the Violation?

For Quarter 2 of this year, we had higher than average TTHM and HAA5 readings at Oak Grove. This, coupled with expected higher readings in Quarter 3 of 2023, raised our LRAA at this location high enough to put us in violation for both DBPs. At Dick's Hill/Ayersville, we had slightly elevated HAA5 readings, which when combined with a very high read in Quarter 3 of 2023 brought us above our MCL and lead to a violation there. See the below tables for further information (the **Red** boxes indicate violations):

Site 501: Oak Grove/Aqua Taba				
Quarter	TTHM	LRAA	HAA5	LRAA
Q4 2022	50.3	-	48.0	-
Q1 2023	37.8	-	24.0	-
Q2 2023	50.5	-	38.0	-
Q3 2023	91.0	57.4	88.5	49.6
Q4 2023	74.6	63.5	52.0	50.6
Q1 2024	56.0	68.0	43.0	55.4
Q2 2024	101.9	80.9	71.8	63.8
Q3 2024	127.4	90.0	67.1	58.5

Site 504: Dick's Hill Parkway/Ayersville Rd				
Quarter	TTHM	LRAA	HAA5	LRAA
Q4 2022	37.7	-	42.0	-
Q1 2023	31.4	-	27.0	-
Q2 2023	47.8	-	39.0	-
Q3 2023	73.2	47.5	90.0	49.5
Q4 2023	51.7	51.0	46.0	50.5
Q1 2024	53.5	56.6	50.0	56.3
Q2 2024	76.5	63.7	57.4	60.9
Q3 2024	137.8	79.9	61.0	53.6

As you can see from the above tables, beginning in Quarter 3 of this year we are no longer in violation for HAA5s at either location. However, with the high numbers also received on TTHMs out at Oak Grove in Q3, we will remain in violation there until Quarter 4 samples are pulled.

What Caused the High TTHM/HAA5 Results?

There are 4 items that play into DBP formation. They are water age, chlorine residual, TOC, and water temperature. The older your water is in the system, the more time it is given to form TTHMs and HAA5s. The higher your chlorine residual and TOC levels are, the higher chance that DBP formation occurs. The higher your water temperature, the quicker chlorine reacts with whatever it finds in the water, notably Organic Carbon, and thus the quicker DBP formation happens.

What Steps Have We Already Taken?

At the treatment plant, we've already taken several steps to keep this from happening again, as well as to get back into compliance quicker. We've lowered our finished chlorine residual range from 2.50-2.70 parts per million (ppm) down to 2.00-2.20 ppm. This step ensures there is less chlorine in the system to form DBPs with. We then lowered our filter chlorine residual range from 0.50-0.70 ppm down to 0.20-0.40 ppm. This will make sure less chlorine interacts with organics before the filtration process. We've also lowered filter run times from a maximum of 150 hours down to a maximum of 100 hours. This will help keep our finished water TOC levels lower so there is less carbon to interact with the chlorine. We've also partnered up with Daniel Taylor and the Water Distribution Department to increase flushing, therefore reducing overall water age in the system.

What Can We Do Moving Forward?

First on the list should be creating and implementing a monthly flushing program to keep water moving throughout the system, specifically in any known problem areas. Second should be working with Alex Wiseman from Carter and Sloope to find a different chemical other than chlorine to feed in the plant before the filters to help oxidize out Iron and Manganese. This would negate any chlorine and organic matter interactions before filtration which in turn would reduce DBP formation. Two chemical options to consider are Potassium Permanganate and Hydrogen Peroxide. Another option to consider would be to update all auto flushers in the system as well as install new ones.