

Stage 2 Monitoring . . . Absurd? Unnecessary? Illogical? Authoritarian? Or Just a Waste of Money?



Many Kansas, small water supply systems have recently completed and submitted to the Kansas Department of Health and Environment (KDHE) their Stage 2 Disinfection Byproducts (DBP) Compliance Monitoring Plan. These plans include when, how often, and where the Stage 2 samplings will occur. When one considers the history and science, the past data, the costs, and the details of the Stage 2 federal regulations, it raises questions concerning the need and benefits of these stringent regulations.

History and science

The two major classes of disinfection byproduct (DBP) chemicals that concern public water systems in Kansas are: 1) the four trihalomethanes (THMs); and, 2) the five haloacetic acids (HAAs). The THMs and HAAs are formed when chlorine reacts with natural organics in the water. The levels of THMs and HAAs formed are dependent on the types of organics in the water, the temperature of the water, the free chlorine contact time, and, somewhat, the bromide level in the water.

For most groundwater systems in Kansas, formation of THMs and HAAs is not a major issue because THMs and HAAs do not form to significant levels because the groundwater does not contain the necessary types of organics in significant amounts to result in high THMs or HAAs.

This formation of THMs and HAAs is a very major issue for systems treating surface water or systems treating groundwater with a significant amount of organics. For most groundwater systems in Kansas, formation of THMs and HAAs is not a major issue because THMs and HAAs do not form to significant levels because the groundwater does not contain the necessary types of organics in significant amounts to result in high THMs or HAAs.

Because high levels of THMs can be formed in the disinfection of surface waters and groundwater under the direct influence (GWUDI) of surface water, EPA passed regulations in late 1979 requiring systems serving 10,000 persons or more to meet a maximum contaminant level (MCL) of 0.10 milligrams per liter (mg/l) of THMs in the drinking water. This is a very low level of THMs; 0.10 mg/l is one-tenth of one part of THM per one million parts of water.

Before corrective action was taken by many Kansas water supplies, the THMs levels in treated surface water were mostly in the range of 0.10 – 0.40 mg/l mainly dependent on the temperature of the water. Higher THMs levels occur in the summer and fall when the water temperatures are higher. Most systems achieved compliance with the MCL of THMs by reducing or controlling the free chlorine contact time by adding ammonia that forms combined chlorine; combined chlorine does not react with organics to form THMs.

In December 1998 EPA expanded the requirements on DBP chemicals. One of the most important changes was

that the requirements were to affect all water supply systems using chlorine as a disinfectant – not just those serving more than 10,000 persons. Second, the THMs MCL was lowered from 0.10 mg/l to 0.080 mg/l and a HAAs MCL of 0.060 mg/l was required. And third, the requirements applied to groundwater systems that were not under the direct influence of surface water. The vast majority of Kansas groundwater supplies are not under the influence of surface water.

Two particular points about the 1998 expanded requirements are as follows. First, the requirements did not apply to systems not treating the water with chlorine such as a water supply that purchases water for another water supply. Second, the vast majority of groundwater systems in Kansas were included in the requirements of monitoring, sampling plan preparation, and recordkeeping. It is with these two requirements where EPA got it totally wrong in Kansas.

In January 2006 EPA expanded the requirements and called them

Stage 2 Disinfection Byproducts

Trihalomethanes

Chloroform or Trichloromethane
 Bromodichloromethane
 Dibromochloromethane
 Bromoform or Tribromomethane

Haloacetic Acids

Monochloroacetic Acid
 Dichloroacetic Acid
 Trichloroacetic Acid
 Monobromoacetic Acid
 Dibromoacetic Acid

“Stage 2”. From an overall standpoint, these requirements are not significantly changed from the 1998 requirements other than the requirements now apply to consecutive systems (systems that purchase water) that do not chlorinate the water. These consecutive systems are solely dependent of the THMs and HAAs levels of the water purchased, as these consecutive systems cannot affect these levels.

THM and HAA data

Most community water supplies in Kansas are small cities and small RWDs. A small number of community water supplies are trailer parks, home associations, and other private water supplies. In Kansas the large water systems of Wichita, Johnson County Water One, Kansas City, Topeka, and Lawrence are surface water systems and serve large populations.

The small groundwater systems and those that purchase from groundwater systems are the most common water systems. As far as THMs and HAAs levels and compliance, the small number of groundwater under the direct influence (GWUDI) systems have organics in the water and they have modified their treatment such that they are in compliance with the MCLs for THMs and HAAs.

The other 441 Kansas groundwater systems have been sampled four to five times each for THMs and HAAs since the 1998 requirements were issued. Those 79 systems that purchase

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Statistics Concerning Community Public Water Supply Systems in Kansas

Treat Surface Water	73
Purchase Surface Water	281
Treat Groundwater	441
Purchase Groundwater	79
Treat GWUDI	5
Purchase GWUDI	7
Total	886

Systems Serving

More than 100,000 persons	5
3,001 - 100,000 persons	94
1,001 - 3,000	195
501 - 1,000	126
25 - 500	466

Number of Persons Served by

Surface Water	1,412,967
Surface Water Purchased	365,807
Groundwater	699,564
Groundwater Purchased	37,683
GWUDI *	147,697
GWUDI Purchased	16,607

* GWUDI is groundwater under the direct influence (of surface water). All Data for KDHE's Annual Compliance Report for 2012

from them have been sampled once during that time. From 2004 through 2012, there have been no violations of MCL for HAAs by a city or a RWD groundwater system.

During that same time for the few groundwater systems that have the types of organics in the water to form THMs, there have only been seven (7) violations of the MCL for THMs by four (4) cities and one (1) RWD. Those five (5) systems began adding ammonia to reduce the free chlorine contact time and have been in compliance for the last four years.

The vast majority of systems using groundwater have had THMs and HAAs that are very low, mostly below 0.01 mg/l. This vast amount of sampling and data show that Kansas groundwater does not have

the type of organics that form THMs and HAAs. In those few systems that use groundwater that do have the certain type of organics that form high THMs and HAAs, KDHE is aware of them and those systems have taken corrective action years ago.

The costs

All Kansas groundwater systems will be sampling in the future for THMs and HAAs to show the compliance with MCLs. It does not matter whether these systems sample yearly, every third year, every ten years, or every day, the money spent will be wasted as the drinking water quality will be good and will not be any different from the past data showing compliance. After a year's data, the requirements allow the sampling frequency to be reduced. But, sampling ought to be eliminated on those systems that have shown good data for many years. In such systems, there is no reason or science to suggest that future water quality or data will be different.

The THMs sample analysis cost approximately \$40 and the HAA sample analysis costs approximately \$145 dollars. That may not be much money for large water suppliers, but it is for small water supplies and it's an expenditure that seems unnecessary.

The Kansas legislature and the U.S. Congress did not pass these requirements. The Stage 2 requirements/laws were written by a few EPA persons in Washington. EPA does not adequately or fairly address the issue of affordability in many areas and even works against such in issuing requirements that have no benefit and just generates data for computers.

Other details of Stage 2 sampling requirements

EPA has requirements for monitoring for Stage 2 that change depending on what population is served. This appears to make a little sense in the small systems cannot afford the costs that larger systems can. But the logic and substance of such does not hold. For Stage 2 for instance:

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- ❖ Why should sampling frequency for a system serving 505 persons be different than a system serving 490 persons? Or any other arbitrary population range?
- ❖ Why should sampling be required on groundwater systems when there are not the types of organics in groundwater to form HAAs at appreciable levels?
- ❖ Why should a consecutive system sample when they do not chlorinate or have the ability to affect/change the THM and HAA levels in the water?

Typical Kansas Data

The following is actual, typical analyses from a small, groundwater system

Date	THMs (mg/L)	HAAs (mg/L)
August 2012	0.0043	0.0018
July 2009	0.0011	0.0005
July 2006	0.0019	0.0008
July 2003	0.0022	0.0000
MCL	0.0800	0.0600

Changes needed

When one understands the science and reviews the Kansas data, it is evident that the sampling for especially HAAs and also THMs in Kansas groundwater-source drinking water is absurd, unnecessary, illogical, authoritarian, and just a waste of money. But it's the law and until the law is changed, systems will have to comply.

In the decades before the 1998 EPA requirements, most Kansas groundwater-source drinking water had low THMs and low HAAs. In the past decade, KDHE data shows most groundwater systems have very low

THMs and HAAs. In the future it is reasonable that the low THMs and HAAs will continue regardless of how much sampling and analyses occurs, and how much money is spent.

As an example of a good modification in regulations, in 2012, EPA approved of a change in the requirements concerning the delivery of the Consumer Confidence Reports (CCR) by public water systems. Until 2013, it was required that these reports be mailed to all water users. In 2012, EPA modified the regulation to allow electronic transfer (email) or posting the report on the Internet. The change has resulted in few, if any, adverse repercussions. There has been no

significant, adverse public reaction because of the change and the drinking water quality has not deteriorated due to the change in the regulation and systems have significant savings

Significant savings in money and time would also be realized without any deterioration of water quality or adverse public reaction if the Stage 2 sampling requirements were eliminated for the vast majority of Kansas groundwater systems and those consecutive systems that do not treat water. But EPA is likely to use the argument that "drinking water quality will deteriorate" if any laws are lessened/eliminated. Sadly, it is a tough "battle" to win.

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