By Pat McCool, KRWA Consultant

Three Questions

for Small Cities and Small Rural Water Districts, Elected Officials, Managers, Operators, Bookkeepers, City Clerks, and Other Citizens

Costs of monitoring, recordkeeping, and compliance are increasing for small cities and small rural water districts, and the cost of water for customers of smaller systems is increasing much more than for customers of much large cities and RWDs in Kansas. So questions need to be asked and changes need to be made so that unnecessary costs are not incurred.

Upcoming Stage 2 Rule compliance sampling for DBPs

KDHE and KRWA have been presenting training and technical assistance sessions since April covering the Stage 2 Rule and chlorination. An important topic discussed is the preparation and submittal of the Stage 2 compliance sampling plans that are due October 1, 2013 for Schedule 3 and Schedule 4 systems. Most small systems in Kansas are involved. These plans are for the upcoming monitoring for the disinfection byproducts (DBPs) of trihalomethanes (THMs) and haloacetic acids (HAAs). The March 2013 issue of *The Kansas Lifeline* has a good article on the Stage 2 Rule.

Kansas has many municipal and RWD water systems that use groundwater as a water source. Most of these groundwater sources have very little or no organics in the water, and THMs and HAAs do not form with any appreciable levels, if at all. KDHE has been sampling many of these water systems that have their own water source and many water systems have been sampled three or four times in the last ten years or so.

A typical example is a city in western Kansas that has two wells and serves 220 persons. The city water has already been sampled on three different occasions and no THMs and no HAAs were found. The typical THMs and HAAs for drinking water from many Kansas groundwater sources are below 10 ug/L. The maximum contaminant level (MCL) for THMs is 80 ug/L and for HAAs is 60 ug/L.

As a general rule most Kansas groundwater-source, chlorinated drinking water contains very low levels of THMs and HAAs. There are perhaps a dozen exceptions but KDHE knows which groundwater supplies those are and those water suppliers have already changed treatment plant operations in order to lower the THMs and HAAs below the MCLs. Those few systems have organics in the groundwater that form the DBPs.

The Stage 2 rule allows for a reduced monitoring frequency if at any time the locational running average is below 40 ug/L for THMs and 30 ug/L for HAAs. This will easily be achieved by most water systems using groundwater as a source. In fact, many have already done such as the above, real-life example shows. For a groundwater system serving fewer than 500 persons, the initial yearly monitoring under Stage 2 can be reduced to every third year.

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One big unfairness in the rule is that if the groundwater system in the example served 500 – 9,900 persons, then the monitoring frequency will not be reduced and will still be a yearly frequency.

There is nothing logical about the 500-person criteria other than that is what someone at EPA decided when the regulations were promulgated. These regulations were not voted on by our elected representatives and were not developed by KDHE. EPA should have given the States more discretion in determining how often the systems should monitor in order to show compliance. The States should have the discretion to require the frequency based on past data and the lack of organics in Kansas groundwater. The situation presently results in unnecessary, additional monitoring costs without any public health benefit.

For example, the cost of analyses for THMs is in the $40 range and the cost for HAAs is in the $120 range. Probably all the THMs and HAAs data from most all Kansas groundwater systems show that the HAAs are always less than the THMs and that the THMs are considerably below the MCL. So, monitoring only for THMs would suffice in most all cases in ensuring that the HAAs are low and would keep monitoring costs significantly less. Again, EPA does not give KDHE any discretion in these matters.

Question 1: What would be the harm and what would be the cost savings if less monitoring for DBPs occurred than presently required by EPA for most all Kansas, small groundwater systems?

TOC analyses and percentage reduction requirement for surface water treatment plants

There are natural organics in surface water in Kansas and a very small percentage of these organics react with free chlorine to form THMs and HAAs. The organics measured by the EPA-required TOC analyses in Kansas surface water and treated water vary widely with a lot of the measurements in the range of 5 mg/L to 9 mg/L. These natural organics are not harmful and do not cause any adverse health effects.

EPA requires a certain percentage of the TOC to be removed because EPA believes that lowering the TOC some percentage will result in lowering the THMs and HAAs that form in the water. However, it takes only a very, very little amount of TOC to form THMs and HAAs above the MCL. From the practical standpoint, the operators do not know if they are removing the particular, small amount of TOC that is reacting to form the THMs.

There are other variables that are much more important that affect THMs and HAAs formation during chlorination. It is those variables that are important to the design engineer and the operator in achieving compliance. Suffice to say, a treatment plant can have much lower THMs and HAAs with higher TOC than another treatment plant with lower TOC and much higher THMs and HAAs. In short, compliance at Kansas treatment plants with THMs and HAAs has nothing to do with a percentage of TOC removed.

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Question 2: Since TOC in itself does not have any adverse health effects, what is the benefit of the EPA-required TOC percentage removal requirement especially in a plant meeting the THMs and HAAs MCLs?

Nitrate level in drinking water and the cost/benefit of reducing the level

The present EPA-required maximum contaminant level (MCL) for nitrate in drinking water is 10 mg/L with nitrate measured as nitrogen. Sometime it is written as 10 mg/L NO_3-N. EPA promulgated this regulation in the late1980s. Up until that time the Kansas Board of Health (KBOH, the predecessor agency of KDHE) and then KDHE had a standard that was equal to 20 mg/L NO_3-N. For many decades there were no problems in drinking water that met the KBOH/KDHE standard.

The reason for the standard is the illness of methemoglobinemia that affects children less than six months of age. If an infant of that age ingests too much nitrate, the nitrates interfere with the infant's blood to transport oxygen. Thus the infant turns a blue color and will become ill and possibly die if medical help is not administered. This condition is also called blue-baby syndrome. Nitrates do not have adverse health effects to infants in the womb, infants older than six months, children, and adults.

The most likely source of drinking water that would cause this condition is from a private well with nitrates many more times the 20 mg/L NO_3-N standard. In Kansas some public water systems in the past and some presently have had nitrates in the range of 10 mg/L to 20 mg/L range and even higher without any known adverse health effect in such infants.

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The nitrate levels in some Kansas water wells have been increasing due to fertilizer use. Some cities have had to construct a nitrate removal water treatment plant to lower the nitrates from the 10 mg/L to 11mg/L range to below the MCL. This results in considerable additional costs to the residential monthly water bill.

Many Kansans have in the past and are presently drinking water with nitrates above the MCL and also in the range of 20 mg/L. Of the water supplied to the public, probably less than one percent is used for drinking and cooking – and much less than that is used for infants less than six months of age.

Considerable costs could be saved if alternatives other than expensive treatment plants were considered and implemented. Maybe a program of education, public notice and supplying bottled water to mothers with infants less than say one year old if the city supplied water had a nitrate above the MCL. That would sure save a lot of money for all the citizens of that water supply.

Question 3: How much more risk is there from an infant less that six months of age drinking water with a nitrate level of 12 mg/L NO_3-N as compared to the same infant drinking water with a nitrate level of 9.4 NO_3-N?

Hint for Question 3: The limit for nitrate in drinking water as recommended by the World Health Organization and many other countries is 11.3 mg/L NO_3-N.

If you think you have good answers for some or all the above questions, you probably do. Please consider emailing your answers to me at pat@krwa.net. If there is a significant response, those results will be listed on the KRWA Web site or summarized in the next issue of *The Kansas Lifeline*. I promise to keep you anonymous. And meanwhile, just in case you see any other organization publishing similar comments as above, let us know.

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