



P.O. Box 226 • Seneca, KS 66538 • 785/336-3760  
FAX 785/336-2751 • <http://www.krwa.net>

February 9, 2010

Kevin Hall, Councilman  
City of Gypsum  
PO Box 176  
Gypsum, Kansas 67448

Re: Ground Water Rule

Dear Kevin,

I appreciate the opportunity to meet with Kathy Hawkes, Jimmie Benfer and you on February 9 to discuss the Ground Water Rule and how it will affect operation of the city's water system. Based on our discussions, it is apparent that the city has sufficient contact time to provide 4-log (99.99%) inactivation of viruses. While the rule does not require all groundwater systems to meet 4-log inactivation, those systems that can are not required to conduct triggered source water monitoring should they experience a coliform positive distribution system sample.

The city's CT (chlorine residual x contact time) is based on 2640 feet of 6-inch line between your chlorination building and your first customer. This section of line contains 3875 gallons of water. This volume is then divided by the maximum well pumping rate of 85 gpm to achieve 45.6 minutes of contact time. This figure is then multiplied by the lowest free residual maintained at the first customer of 1.0 mg/L to obtain a CT value of 45.6 mg-min/L. Since this figure exceeds the minimum CT value needed of 4.0 mg-min/L, the city provides 4-log inactivation.

In order to officially report 4-log inactivation to KDHE, the city must submit a "CT Calculation Worksheet" along with the "Certification of 4-Log Treatment Under the Groundwater Rule" form to KDHE. As promised, I have enclosed a calculation worksheet for your system. An elected official should sign the certification form that was left with you. Submitting these two documents will officially notify KDHE that the city intends to provide 4-log inactivation.

As part of providing 4-log inactivation, Gypsum will be required to conduct daily compliance monitoring. This simply means the city must monitor residuals at the chlorination building daily and submit that data to KDHE monthly. The data should confirm that residuals are never less than 1.0 mg/l. All monthly reports must be submitted by the 10<sup>th</sup> of the month for the previous month. I left Jimmie a form entitled "Monthly Disinfection Report for the Groundwater Rule" which can be used for this purpose. The right side of the

form is for recording residual readings leaving the chlorination building. You can also use the left side to record your daily distribution system residuals so that all your residual data is on the same form. **Please note that residuals must be monitored daily, including weekends and holidays, at both the POE and in the distribution system. Otherwise, monitoring violations will occur and KDHE will require the city to notify all of your customers via a special mailing.**

If I can be of further assistance, please feel free to call me at 913-850-8822. My email address is [jeff@krwa.net](mailto:jeff@krwa.net). Funding for the above assistance was provided through a contractual arrangement between the Kansas Department of Health and Environment (State Revolving Loan Program set-aside) and the Kansas Rural Water Association (KRWA). Please visit the KRWA website at [www.krwa.net](http://www.krwa.net) for news and information concerning water and wastewater utilities, training opportunities, and other KRWA programs.

Sincerely,

Jeff Lamfers  
Consultant

Enclosure

c: Larry Hawkes, Mayor  
Jimmie Benfer, Operator  
Kathy Hawkes, City Clerk  
Kelly Kelsey, KDHE, Topeka  
Marsha Carpenter, KDHE, Salina



## Understanding "CT" Ground Water Rule

**CT = C X T**

**C** = concentration of disinfectant residual (mg/L)

**T** = contact time (minutes) between point of disinfectant application and point where residual is measured

CT is express as (mg-min)/L

You will need to know:

- C (mg/L), the measured disinfectant residual at or before the first customer
- Length (ft) of each pipe between point of application and point residual is measured
- Diameter (ft) of each pipe
- Maximum Daily flow (gallons per minute) of system

PWS Name: City of Gypsum

PWS ID: \_\_\_\_\_

Basic Formulas:

Your Water System Calculations:

<b>Calculating Pipe Cross-Sectional Area (ft<sup>2</sup>):</b> ( $\pi \div 4$ ) X (diameter <sup>2</sup> )	<b>0.196</b> ft <sup>2</sup>
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<b>Calculating Pipe Volume (gallons):</b> pipe length X cross-sectional area	<b>3875.4</b> gallons
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<b>Calculating Disinfectant Contact Time (minutes):</b> pipe volume ÷ flow	<b>45.6</b> minutes
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<b>Calculating CT (mg-min/L or CT):</b> disinfectant residual X contact time	<b>45.6</b> mg-min/L (CT)*
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\* Compare this CT value (mg-min/L) with the required CT value from the below table at the appropriate temperature for 4-log Inactivation. If your system's CT is larger than the corresponding CT value in the below table, then your water system is achieving 4-log inactivation of viruses with free chlorine.

CT Values for Inactivation of Viruses by Free Chlorine, pH 6.0 - 9.0

Degrees (C)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Degrees (F)	33.8	35.6	37.4	39.2	41.0	42.8	44.6	46.4	48.2	50.0	51.8	53.6	55.4	57.2	59.0	60.8	62.6	64.4	66.2	68.0
Inactivation (log)																				
2	5.8	5.3	4.9	4.4	4.0	3.8	3.6	3.4	3.2	3.0	2.8	2.6	2.4	2.2	2.0	1.8	1.6	1.4	1.2	1.0
3	8.7	8.0	7.3	6.7	6.0	5.6	5.2	4.8	4.4	4.0	3.8	3.6	3.4	3.2	3.0	2.8	2.6	2.4	2.2	2.0
4	11.6	10.7	9.8	8.9	8.0	7.6	7.2	6.8	6.4	6.0	5.6	5.2	4.8	4.4	4.0	3.8	3.6	3.4	3.2	3.0