

2012 Drinking Water Quality Consumer Confidence Report

The University of Kansas - Lawrence Campus - July 1, 2013

Prepared by the KU-LC Department of Environment, Health & Safety

The purpose of this report is to inform people who work for, attend, or visit the University of Kansas Lawrence Campus (KU-LC) about the quality of the drinking water provided to them by the KU-LC Public Water Distribution System. The KU-LC is committed to providing users a safe, clean and dependable supply of drinking water.

This 2012 Drinking Water Quality Consumer Confidence Report presents the results from analyses conducted by the KU-LC Department of Environment, Health & Safety (KU-LC EHS) and the City of Lawrence of drinking water samples collected on the KU-LC and at the City of Lawrence drinking water treatment plants during the **2012 calendar year** (Tables 1, 2, 3, and 4). The overall conclusion of this report, based on the evaluation of these water quality test results, is that the drinking water provided to you by the KU-LC is safe and has not violated any federal or state water quality regulatory compliance standards. The KU-LC and the City of Lawrence, from whom the KU-LC purchases its water, routinely monitor the quality of the drinking water for all contaminants of concern. More information about contaminants and their potential health effects can be obtained by calling the U.S. Environmental Protection Agency's Safe Drinking Water Hotline (800-426-4791) or by visiting their [website](#).

All drinking water, including bottled water, can be presumed to contain small amounts of contaminants (i.e., any physical, chemical, biological, or radiological substance or matter in water). However, the presence of contaminants does not necessarily indicate that the water poses a health risk. The U.S. Environmental Protection Agency (EPA) has regulations that limit the amount of specific contaminants in drinking water provided by public water systems. To better understand the possible health risks associated with the exposure to most contaminants, a person would have to drink two liters of water every day at the allowable EPA maximum contaminant level (MCL) in drinking water for a lifetime (approximately 70 years) to have a one-in-a-million chance of having the described health effect.

In our continuing effort to vigilantly safeguard our drinking water supply, it may be necessary to make improvements in the water distribution system. Therefore, brief interruptions in the drinking water supply may occur from time to time. All public meetings regarding the KU-LC water system are posted on the KU-LC EHS Events [website](#). If you have any questions, comments or concerns about the quality of the drinking water provided to you by the KU-LC or have any question about the

information contained in this report, please contact Jon Rossillon, KU-EHS Hazardous Materials/Environmental Protection Manager, by phone (785-864-4089) or by email (jrossillon@ku.edu). We welcome your input.

It should also be noted that some individuals may be more vulnerable to specific contaminants in drinking water than the general population. People who may be more vulnerable include individuals who are immuno-compromised such as those who have cancer and are undergoing chemotherapy, have undergone a recent organ transplant, have HIV/AIDS or other immune system disorders (e.g., rheumatoid arthritis, lupus erythematosus, or multiple sclerosis), some elderly persons, and infants. These individuals or their parent/guardian should seek advice from their health care provider about the potential risk due to exposure to any possible drinking water contaminant.

One potential contaminant, *Cryptosporidium*, is required by EPA to be discussed in this report in order to inform individuals with weakened immune system that resulting symptoms may be worse, last longer, and be life threatening {individuals with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS [especially if their CD4+ T-cell count is lower than 200/mm³ – see Center for Disease Control (CDC) [web page](#)] or other immune system disorders, some elderly, and infants}. *Cryptosporidium*, a very small, single-celled protozoan parasite, is present in surface waters throughout the US. Ingestion of this pathogen may cause cryptosporidiosis, an abdominal infection. The symptoms of this infection include diarrhea, nausea and abdominal cramps. The City of Lawrence regularly monitors its source waters for this parasite. Guidelines on ways to lessen your risk of exposure to this and other microbiological organisms can be viewed on the Center for CDC [web page](#) or obtained by calling the EPA Safe Drinking Water Hotline (800-426-4791).

In order to understand the sources of contaminants, the sources of drinking water need to be reviewed. The sources of drinking water include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it naturally dissolves minerals and can also pick up materials associated with the soil, plants, and substances associated with animal and human activities. In some instances, these materials may be considered contaminants and, if present in high enough concentrations, pose a risk to human health.

The two primary drinking water sources for the KU-LC are the Kansas River and Clinton Lake. Six Kansas River alluvial wells are used occasionally and represent a very minor source of drinking water. An assessment of these water sources was completed by the state of Kansas in 2003. The results of that source water assessment can be viewed on the Kansas Department of Health and Environment (KDHE) [web page](#).

Contaminants in drinking water fall into one of five categories:

- **Microbial contaminants:** for example, pathogens that may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
- **Inorganic chemical contaminants:** for example, salts and metals that can be naturally occurring and also originate from urban stormwater runoff, industrial and domestic wastewater discharges, oil and gas production, mining, and farming.
- **Organic chemical contaminants:** these are synthetic and volatile organic chemicals that can arise as byproducts of industrial processes and petroleum production as well as from gas stations, urban stormwater runoff, and septic systems.
- **Pesticides:** chemical preparations used to kill or control pests (e.g., herbicides for plants and insecticides for insects) that may come from many sources including agriculture, urban stormwater runoff, residential, and commercial activities.
- **Radioactive contaminants:** radionuclides found naturally in the soil or the result of oil/gas production and mining activities as a result of their extraction processes.

To assist you in understanding this report, the following explanations for abbreviations and definitions of various terms used in this report are provided:

AL – Action Level – The concentration of lead or copper in drinking water that, when exceeded, triggers the need for treatment techniques or other actions.

EPA – United States Environmental Protection Agency – The Federal Regulatory Agency responsible for establishing for drinking water standards.

KDHE – Kansas Department of Health and Environment – The State of Kansas Regulatory Agency responsible for establishing drinking water standards.

Lead and Copper 90th Percentile – The concentration of lead or copper in a water sample that is the 90th percentile rank (ordered by concentration) of all samples.

MCL – Maximum Contaminant Level – The highest concentration level of a contaminant that is allowed in drinking water. The MCL is set as close to the MCL goal (MCLG) as feasible using the best available treatment technology.

MCLG – Maximum Contaminant Level Goal – The contaminant concentration at or below which there is no known or predicted health risk.

MPA – Monitoring Period Average – Average of samples results collected during a defined time frame.

MRDL – Maximum Residual Disinfectant Level – The highest concentration level of residual disinfectant (i.e., chlorine) that is allowed in drinking water.

MRDLG – Maximum Residual Disinfectant Level Goal – The concentration level of residual disinfectant (i.e., chlorine) in drinking water at or below which there is no known or predicted health risk. The MRDLG allows for a margin of safety.

µmhos/cm – Micromhos per Centimeter – These units express the ability of a material (e.g., water) to conduct the flow of an electrical current (i.e., the specific conductance). The more electrically conductive a material is, the higher the mho (pronounced mō) value reading. In relation to drinking water, specific conductance is related to water temperature and the amount of dissolve minerals in the water. It does not identify the specific minerals that are present.

N – Nitrogen – atom; atomic weight 14.0067. When nitrate concentrations are presented “as N,” it refers to only the weight of the nitrogen in each molecule of nitrate [Nitrate (NO_3) weight = 62.0049 while Nitrate as N weight = 14.0067].

N/A – Not Applicable or Not Available – The information does not apply for this contaminant and/or category or is not available (e.g., not measured).

ND – Not Detected – The detection limit for a compound (e.g., the lowest concentration of a contaminant that can be measured) is determined by the analytical method that is used. If the concentration of a contaminant is listed as ND, it may still be present, however, below the level detectable by that method.

NTU – Nephelometric Turbidity Units – The turbidity of water (i.e., clarity, cloudiness) is expressed in terms of NTU units. Turbidity, an optical property of water, is caused by suspended particles in the water that either scatter or absorb light. These particles can be both inorganic (e.g., soil) and organic (e.g., algae). The more suspended particles in the water, the more light is scattered and the more turbid the water would appear. A water sample with a turbidity level of five (5) NTU would appear noticeably cloudy.

P – Phosphorus – atom; atomic weight 30.9737. The portion of the total phosphorus or orthophosphate (PO_4^{-3}) represented by only the weight of the phosphorus atoms [the weight of Orthophosphate (PO_4^{-3}) = 94.9713 while the weight of Orthophosphate as P = 30.9737].

pCi/L – Picocuries per Liter – As a unit to measure radioactivity, a picocurie is an extremely small amount of radioactivity (10^{-12} of a curie or 1 millionth of a millionth of a curie).

pH Units – pH units measure how acidic or alkaline (i.e., basic) a solution is. A pH of 7 is neutral. The pH is a measure of the concentration of free hydrogen ions (H^+) in the solution. Specifically, pH is the negative logarithm of the hydrogen ion concentration ($pH = -\log[H^+]$). Therefore, a lower pH unit represents a larger concentration of hydrogen ions – i.e., more acidic. Also, a change of one pH unit represents a 10-fold change in the concentration of hydrogen ions (e.g., a solution having a pH 6 has 10 times more hydrogen ions than a pH 7 solution).

ppb – **Parts per billion** is a concentration expression of a solution equivalent to micrograms per liter ($\mu g/L$); 3 ppb is equal to 3 $\mu g/L$. To put into perspective what a part per billion represents, if you won \$10 million dollars in the lottery, one penny (\$0.01) would equal one part per billion of your winnings.

ppm – **Parts per million** is a concentration expression for a solution equivalent to milligrams per liter (mg/L); 3 ppm is equal to 3 mg/L . To put into perspective what a part per million represents, if you graduated from KU in 2013 (approximately 5,000 students graduated) and each student was given a large box of popcorn (~220 grams each), one piece of popcorn (~1.107 grams) would equal one part per million of all that popcorn.

RAA – Running Annual Average is the average concentration of a substance present in samples obtained over the reporting year (January through December).

SMCL – **Secondary Maximum Contaminant Level** is established by the Kansas Department of Health and Environment (KDHE) with guidance from the United States Environmental Protection Agency (EPA). These secondary contaminants do not pose a health risk; rather they affect various aesthetic qualities of drinking water relating to the public acceptance of drinking water (e.g., taste, odor, and color).

TT – **Treatment Technique** – A process (i.e., technology), when installed, leads to the reduction in the level of a contaminant (e.g., turbidity and organic carbon).

Table 1 presents the tests results for primary contaminants conducted on water samples collected directly from the KU-LC drinking water distribution system. *Escherichia coli* (abbreviated as *E. coli*) bacteria are tested on a monthly schedule. Copper and lead are tested every three years. These sampling schedules are established by the EPA under the National Primary Drinking Water Regulations (40 CFR [141](#) & [143](#)).

E. coli are a large and diverse group of bacteria. These bacteria originate only from the digestive system of mammals, including humans. The presence of *E. coli* in water is a strong indication of recent sewage or animal waste contamination which

makes them excellent indicator organisms. Most strains of *E. coli* bacteria are harmless and are an important part of a healthy human digestive tract; however certain strains may cause illness. Sources *E. coli* contamination include: runoff from animal feedlots and agricultural areas where manure fertilizer is used, wildlife that use the source water as part of their natural habitat, runoff from areas contaminated with pet manure, septic system failure, and wastewater treatment plants if the water is inadequately treated. *E. coli* may cause short-term health effects such as diarrhea, cramps, nausea, or headaches. These microbes may pose a more significant health risk to infants, young children, the elderly, and people with severely compromised immune systems. In rare cases, *E. coli* infection can lead to kidney failure and death.

Table 1. Primary Drinking Water Contaminants monitored from KU campus water supply system (January - December 2012 except where indicated).

Parameter	Concentration Goal (EPA MCLG)	Highest Level Allowed (EPA MCL)	Highest Level Detected	Range
<i>Escherichia coli</i> (<i>E. coli</i>) Bacteria	0 samples	Routine sample is <i>E. coli</i> + and one repeat sample is Total Coliform+ or <i>E. coli</i> +	0 samples	N/A
Total Trihalomethanes (THM) (2012)	0 ppb	80 ppb	62 ppb	57 - 62 ppb
Haloacetic Acids (HAA) (2012)	0 ppb	60 ppb	23 ppb	17 - 23 ppb
Total Chlorine	MRDLG = 4.0 ppm	MRDL = 4.0 ppm	3.5 ppm	0.0 - 3.5 ppm
Parameter	Concentration Goal (EPA MCLG)	Highest Level Allowed (EPA MCL)	90th Percentile	Range
Copper (tested in 2011)	1.3 ppm	1.3 ppm (AL)	0.120 ppm	0.005 - 0.140 ppm
Lead (tested in 2011)	0 ppb	15 ppb (AL)	3.8 ppb	ND – 5.6 ppb

Disinfectants (e.g., chlorine and chloramine) are an essential element of drinking water treatment because of the protection they provide against waterborne disease-causing microorganisms. These disinfectants can react with naturally occurring materials in the water to form byproducts such as trihalomethanes and haloacetic acids. An extensive research effort is currently underway to better understand the potential health risks (e.g., bladder cancer) associated with exposure

to disinfection byproducts. Because of these potential health concerns, the KU campus drinking water is monitored throughout the year for these byproducts.

Ingestion of lead can cause serious health problems especially for pregnant women, infants and young children. These health problems include damage to the kidneys, liver, and neurological system including the brain. The most common sources of lead are the ingestion of lead-based paint (banned in 1978; homes built before 1960 may contain lead-based paint) and/or contaminated soils. Lead in drinking water is not a common source of lead poisoning. The source of lead in drinking water is primarily from the water delivery system (e.g., pipes, solder, and brass fixtures). When water has been sitting for several hours, flushing the tap for a time period of 30 seconds to 2 minutes before using the water for drinking or cooking can minimize the potential for lead exposure. Information on lead in drinking water is available from the EPA's Safe Drinking Water Hotline (800-426-4791) or at their [web page](#).

Although copper is an essential nutrient (Recommended Daily Allowance 0.9 milligram for both adult men and women over the age of 19; *Dietary Reference Intakes Essential Guide Nutrient Requirements*, Food and Nutrition Board, National Institute of Medicine, National Academies, 2006), excess copper consumption over a short period of time can result in temporary gastrointestinal distress (e.g., nausea, vomiting, diarrhea and stomach cramps). People drinking water containing excessive copper over many years may suffer liver or kidney damage. Individuals with Wilson's Disease, a rare inherited (genetic) disorder (~1 in 30,000 people), should consult their personal physician if copper is detected in their drinking water. The main source of copper in drinking water is the leaching of copper from water delivery pipes and bathroom fixtures due to corrosive (acidic) water. In water systems that have been sitting unused for several hours, running the water for time period of 30 to 60 seconds before using it for drinking or cooking will significantly reduce the concentration of copper.

Table 2 presents the results of tests for primary contaminants in the drinking water sampled at the City of Lawrence drinking water treatment plants ([2013 Consumer Confidence Report](#), City of Lawrence). Total organic carbon (TOC) has no health effects; however, total organic carbon provides a medium for the formation of disinfection byproducts (e.g., trihalomethane and haloacetic acid compounds; Table 1) that may have possible carcinogenic effects (e.g., bladder cancer). Turbidity also has no health effects; however, it can interfere with disinfection and provide a medium for microbial growth. The primary source of the contaminants listed in Table 2 is the erosion of natural deposits (e.g., soil). Other sources include runoff of pesticides (e.g., pesticides, like atrazine, use on row crops), decay products of natural and human-made deposits, water additives (e.g., fluoride which helps prevent tooth decay), and runoff of fertilizers (e.g., nitrate from agricultural areas or residential properties).

Table 2. Primary Drinking Water Contaminants Monitored at the Lawrence Drinking Water Treatment Plants (January to December 2012).

Parameter	Concentration Goal (EPA MCLG)	Highest Level Allowed (EPA MCL)	Highest Level Detected	Range
Arsenic	0 ppb	10 ppb	2.8 ppb	ND - 2.8 ppb
Atrazine	3 ppb	3 ppb	0.30 ppb	ND - 0.30 ppb
Barium	2 ppm	2 ppm	0.079 ppm	0.014 - 0.079 ppm
Chloramine	4 ppm (MRDLG)	4 ppm (MRDL)	3.6 ppm (RAA)	3.5 - 3.6 ppm
			3.7 ppm (MPA)	
Chromium	100 ppb	100 ppb	2.5 ppb	ND - 2.5 ppb
Combined Radium (isotopes 226 & 228)	0 pCi/L	5 pCi/L	1.0 pCi/L	ND - 1.0 pCi/L
Fluoride	4 ppm	4 ppm	0.62 ppm	0.26 - 0.62 ppm
Nitrate (as N)	10.0 ppm	10.0 ppm	1.0 ppm	ND - 1.0 ppm
Selenium	50 ppb	50 ppb	2.0 ppb	ND - 2.0 ppb
Total Organic Carbon	N/A	TT	3.7 ppm (RAA)	2.4 - 3.7 ppm
Turbidity (RAA)	N/A	TT	0.298 NTU	0.070 - 0.298 NTU

Table 3 and 4 are lists of secondary contaminants detected in the drinking water at the City of Lawrence drinking water treatment plants. These secondary contaminants primarily affect the aesthetic qualities and are not federally regulated as they do not pose a health risk. KDHE sets limits for these contaminants to assure that the public receives the best quality water possible. The major source of secondary contaminants is the erosion of natural deposits (e.g., soil). Another source is additives to control corrosion of water delivery pipes (e.g., orthophosphorous).

Table 3. Secondary Drinking Water Unregulated Contaminants not having a Secondary MCL detected in the drinking water during monitoring at the Lawrence Drinking Water Treatment Plants (January to December 2012).

Parameter	Federal Level Recommended	Highest Level Detected	Range Detected
Alkalinity (as mg/L CaCO ₃)	300 ppm	112 ppm	50 - 112 ppm
Bromate	10 ppb	1.1 ppb	ND - 1.1 ppb
Bromide	0.05 ppm	0.06 ppm	0.04 - 0.06
Calcium	200 ppm	27 ppm	22 - 27 ppm
Chlorate	N/A	100 ppb	45 - 100 ppb
Hexavalent Chromium	N/A	0.0017 ppm	0.0003 - 0.0017
Magnesium	150 ppm	15.0 ppm	6.3 - 15 ppm
Nickel	0.1 ppm	0.0017 ppm	ND - 0.0017 ppm
Orthophosphate (as P)	N/A	0.17 ppm	ND - 0.17 ppm
Perchlorate	N/A	0.16 ppb	ND - 0.16 ppb
Potassium	100 ppm	12.0 ppm	3.2 - 12.0 ppm
Silica	50 ppm	15.0 ppm	0.7 - 15.0 ppm
Sodium	100 ppm	96 ppm	16 - 96 ppm
Specific Conductance	1,500 µmhos/cm	878 µmhos/cm	290 - 878 µmhos/cm
Total Hardness (as mg/L CaCO ₃)	400 ppm	166 ppm	88 - 166 ppm
Total Phosphorus (as P)	5 ppm	0.26 ppm	ND - 0.26 ppm

Table 4. Secondary Drinking Water Unregulated Contaminants having Secondary MCL's detected in the drinking water during monitoring at the Lawrence Drinking Water Treatment Plants (January to December 2012).

Parameter	Highest Level Allowed (SMCL)	Highest Level Detected	Range Detected
Aluminum	0.05 - 0.20 ppm	0.170 ppm	0.062 - 0.170 ppm
Chloride	250 ppm	100 ppm	17 - 100 ppm
Iron	0.3 ppm	0.99 ppm	ND - 0.99 ppm
pH	6.5 – 8.5 pH Units	9.6 pH Units	8.0 - 9.6 pH Units
Sulfate	250 ppm	110 ppm	32 - 110 ppm
Total Dissolved Solids	500 ppm	450 ppm	200 - 450 ppm

Web Links for Additional Drinking Water Quality Information

- [KU Department of Environment, Health & Safety](#)
- [KDHE Public Water Supply Section](#)
- [KDHE Source Water Assessment Report, City of Lawrence](#)
- [EPA Ground Water and Drinking Water](#)
- [2013 Consumer Confidence Report, City of Lawrence](#)

Note: Some of these data and information presented in this report are from the 2013 [Consumer Confidence Report](#), City of Lawrence. The format has been modified. This report is available on the KU-LC [EHS website](#) (http://www.ehs.ku.edu/documents/ehs_reports/index.aspx).