



# Well Contamination Causes Beverly to Develop a New Water Source

**T**he city of Beverly is a small town, very typical of many of towns in Kansas, with a population of about 160. Beverly was incorporated in 1904 and was named after Beverly, West Virginia, the native home of a pioneer settler. Beverly is located in Lincoln County about 11 miles east of the city of Lincoln along Kansas State Highway 18, between Highway 18 and the Saline River. Lincoln County was formed in 1870 and was named in honor of the 15th President of the United States, Abraham Lincoln. Anyone traveling through Lincoln County cannot help but notice the limestone fence posts as well as the many buildings built with limestone. In fact, with the importance of the use of limestone in building construction in the area, in 1989 the Kansas Legislature named Lincoln County as “The Post Rock Capital of Kansas”.

Beverly’s water supply system originally consisted of one well located at the southeast corner of town. Later a second well was drilled to the west of the original well to allow redundancy in the supply. The water from these wells was considered satisfactory until the establishment of the maximum contaminant level (MCL) for nitrate. When the Environmental Protection Agency (EPA) reduced the MCL level at 10 mg/L for nitrate, the city realized they might have a problem. The EPA set a limit for nitrate because water containing high nitrate can cause infant cyanosis or blue baby poisoning in infants less than six months of age.

Other contaminants including selenium and uranium eventually were found in the city well water. Both are included in the EPA primary standards. The MCL for selenium is 0.05 mg/L and for uranium, 30  $\mu$ g/L. Uranium in water has no taste or smell and can only be detected by testing. High uranium can cause kidney problems and at high levels may increase the risk of cancer. Excess selenium may cause hair loss, changes in blood, kidney, intestine, or liver problems.

The storage tank for Beverly is a standpipe located at the northwest corner of town.

## City chooses to drill new wells

These violations resulted in the city receiving an administrative order from the KDHE. The administrative order along with the regular public notifications caused the city to pursue corrective action. The city began looking for another location to drill a well.

A site was eventually chosen just off the southwest corner of town, north of the Saline River. While the water from this well complied with the nitrate standard, the water did contain high levels of iron and manganese. Iron and manganese when oxidized while pumping, and with the addition of chlorine, will cause staining of plumbing fixtures and laundry and is the source of consumer complaints. Since iron and manganese in water are considered nuisance constituents and do not cause any known health issues, there is no EPA primary standard for them. They are however, included in EPA's secondary standards with the recommended levels for iron at 0.3 mg/L and manganese at 0.05 mg/L (See sidebar).

According to James Peterson, Mayor, the city council considered options including building a treatment plant and a connection to a rural water district; however, neither of the options was considered to be cost effective. In December 2013, the city hired the engineering firm of Schwab-Eaton, PA, Manhattan, to locate another groundwater source.

In May 2015, three new wells began producing water for the city. The wells are located about one-half mile north of town; they were drilled by Peterson Irrigation, Lindsborg. The three wells are pitless unit construction and deliver water through a control building where chlorination is provided. The wells range in depth from 103 to 113 feet and were drilled into sandstone. The original plan did not include three wells but with the low yield from the sandstone formation, (10 to 20 gpm from each well), three wells were needed to supply the city.

Installation of the pre-fab control building and pipeline was completed by Larson Construction, Manhattan. About 2,000 feet of 4-inch pipeline were installed, including a directional bore under

## EPA Drinking Water Standards

In addition to establishing Primary Drinking Water Regulations (*which are legally enforceable standards*) that include nitrate, uranium, and selenium, all of which impacted Beverly, the EPA also has established National Secondary Drinking Water Regulations (NSDWRS) that set non-mandatory water quality standards for 15 contaminants. EPA does not enforce these "secondary maximum contaminant levels" (SMCLs). They are established only as guidelines to assist public water systems in managing their drinking water for aesthetic considerations, such as taste, color, and odor. These contaminants are not considered to present a risk to human health at the SMCL.

### Table of Secondary Drinking Water Standards

Contaminant	Secondary MCL	Noticeable Effects above the Secondary MCL
Aluminum	0.05 to 0.2 mg/L*	colored water
Chloride	250 mg/L	salty taste
Color	15 color units	visible tint
Copper	1.0 mg/L	metallic taste; blue-green staining
Corrosivity	Non-corrosive	metallic taste; corroded pipes/ fixtures staining
Fluoride	2.0 mg/L	tooth discoloration
Foaming agents	0.5 mg/L	frothy, cloudy; bitter taste; odor
Iron	0.3 mg/L	rusty color; sediment; metallic taste; reddish or orange staining
Manganese	0.05 mg/L	black to brown color; black staining; bitter metallic taste
Odor	3 TON (threshold odor number)	"rotten-egg", musty or chemical smell
pH	6.5 - 8.5	low pH: bitter metallic taste; corrosion high pH: slippery feel; soda taste; deposits
Silver	0.1 mg/L	skin discoloration; graying of the white part of the eye
Sulfate	250 mg/L	salty taste
Total Dissolved Solids (TDS)	500 mg/L	hardness; deposits; colored water; staining; salty taste
Zinc	5 mg/L	metallic taste

\* mg/L is milligrams of substance per liter of water.



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No, it's not new but the city's office building constructed in 1947 sports a new coat of paint and serves the city just fine.



George Salazar, Operator, prepares to check the water for chlorine residual.

Hauling water in many rural areas of Kansas continues. A landowner's tank is being filled at the bulk filling station in Beverly. The city's water system is protected with the air gap.



the contamination in the old wells. This project did cause customers to notice an increase in their monthly rates. The current rates are \$20.50 for the first 3,000 gallons plus \$5.00 per 1,000. This represents a \$6.00 increase for customers using 5,000 gallons per month. When asked if the city had received any complaints or comments with the new water, both Mayor Peterson and Caroline Piersee, City Clerk, stated that negative comments have been virtually eliminated. In fact, Mayor Peterson noted that prior to adding the new wells most people in town had not been drinking the water but with the new source, residents are now drinking city water.

Highway 18, connecting the control building to the city distribution system at 3rd Street.

The cost of the project was \$218,000. Funding sources included a Community Development Block Grant (CDBG) and a State Revolving Loan through the Kansas Public Water Supply Loan Fund (KPWSLF). The city also qualified for "principal forgiveness" through the State Revolving Loan Fund (SRF) because of

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### KRWA's Annual Conference & Exhibition

The 2016 Annual Conference and Exhibition sponsored by KRWA will be held at the Century II Convention Center in Wichita on March 29, 30 and 31. The conference provides an excellent opportunity to learn from the many experts in the field as well as networking with peers. I hope all readers can find time to take advantage of the training provided at

"the largest water and wastewater conference in Mid-America". You will not regret attending this conference; it's got something for everyone.



In 2011, a portion of K-18 highway from US 81 to the western boundary of Lincoln County was named the "Medal of Honor Recipient Donald K. Ross Memorial Highway. Mr. Ross was born in Beverly and as an officer, received the first Medal of Honor of WWII. This sign stands along K-18 at Beverly.

*Bert Zerr is currently a consultant with KRWA. He has been with KRWA since 2005. Prior to that, Bert was a District Engineer with the KDHE in the Salina District Office for 32 years.*





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