



Larned Replaces Source Water Plan, Starts Water Protection Talk With Neighbors

Why are people drilling wells in our wellfields? Has the cost of potable water gotten too high for a luxurious lawn? Is there something romantic about being “self-reliant” and pumping groundwater from beneath our own land? Could it be that drought might have caused some to think that possible rationing would leave them with less water than they need? Whatever it is, water systems should strongly consider methods to control this activity. This story will show how one water system is doing this and more, one well at a time, after the adoption of a source water protection plan.

Last year, the city of Larned asked Kansas Rural Water Association to provide an update to their Source Water

Much has changed in 15 years, and there is a lot more readily available information to consider when analyzing threats and responses.

These spray tanks are stored in close proximity to the well drilled near the city of Larned municipal well. Notice that at least one is half-full of some unknown liquid.

Protection Plan that was adopted in 2000. After review of the contents of the original plan, and because it was over 15 years old, it was decided to rewrite the whole document. Much has changed in 15 years, and there is a lot more readily available information to consider when analyzing threats and responses. On September 5, 2017, the city council adopted the new plan.

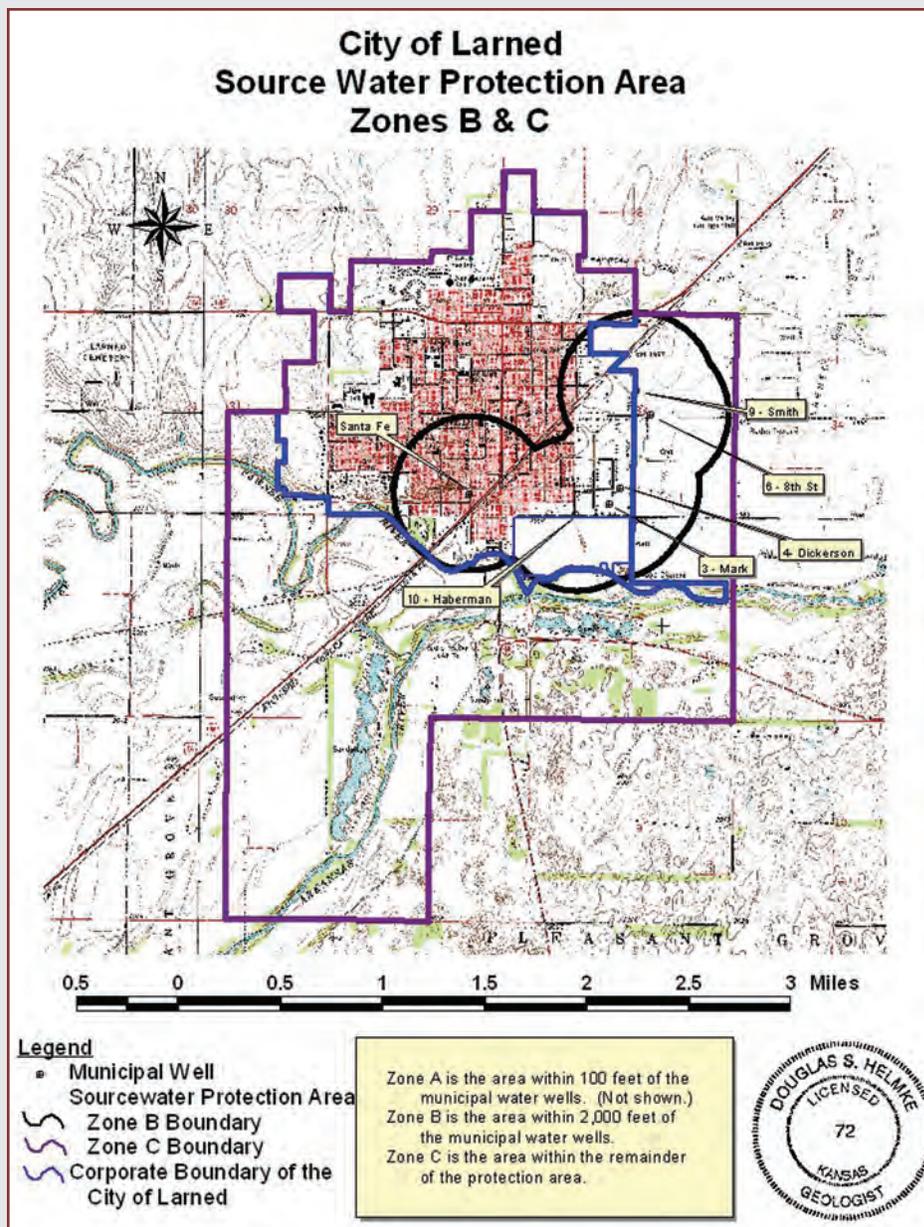
When writing a new plan, it is a good idea to do an internal evaluation of the water system. It would be hypocritical to ask an owner of a potential contamination threat to fix their situation, if you are ignoring one or more of your own threats. To start this internal review, an understanding of the history of the public water system was necessary. Sanborn Fire Insurance Maps were viewed to see where the early water wells might have been located. The first Sanborn map for Larned that was found was published in 1884, about 12 years after the founding of the community. The map shows in its legend, “No Steam & No Hand Engines, No Independent Hose Carts; Water Facilities Not Good.” The map also showed a number of private

wells. Some were even in the right-of-way for Broadway Street, the main thoroughfare in town.

By 1887 however, the Sanborn Company declared the water facilities as very good, with a 100 foot tall standpipe 80 feet above the business district. A well was shown to exist at the water plant near 2nd and Carroll Streets, near the Pawnee River. The next map that was found is dated 1892. It shows a coal powered water pumping station with two wells owned by the Larned Water Company. It is located at the foot of Main Street, near the Arkansas River. The 1899 map states that 16 driven wells and one open well are being used. The 1920 map states that the large well is now in reserve status and that five bored wells are located throughout the town. Kansas Geological Survey Bulletin No. 80 published in 1949 refers to eight wells, four of them about one mile north of town. The city’s water rights authorize at least five newer wells located in the Arkansas River alluvium on the east side of Larned. The sixth well at the power plant might be one of the eight wells mentioned in Bulletin No. 80.

The aquifer currently being used by the city of Larned is the alluvium, or stream-deposited materials of the Arkansas River, mainly east of the city. Recharge is likely from nearby precipitation and from the Arkansas or Pawnee Rivers, when they are flowing past the wellfield. A review of the water rights was done to understand the authorized locations of the wells, and the authorized annual quantities and instantaneous diversion rates for each well. A visit to the Pawnee County Register of Deeds and Appraiser was also done to confirm ownership of the land on which the wells are located. It was determined that one well was not in the platted, city-owned lot as described in the water right document, but was either located in an adjacent lot or in the nearby street right-of-way. Just before adoption of the plan, city staff investigated the situation and found that the well was in the right-of-way and that a well site easement was not necessary. The Division of Water Resources will be asked to revise the written description of the well location when an update is made to the pertinent water right documents in the future.

With an understanding of the well locations, visual surveys of the areas near the wells were completed to assess the threats to the water quality and water system infrastructure. The areas within 100 feet are identified as Zone A by the Kansas Source Water Assessment Program of 2003. This area is the most critical as there is very little chance for contaminants to be diluted and the travel time between a release and introduction to the water system is the shortest. Within this zone were found gardens, lawns, streets and sewers, fields, a stormwater ditch, electricity generation and substation, and the general urban area. Zone B is designated as the area from 100 feet to 2,000 feet. The list of contamination sources for this area is very long and includes nearly everything one would find in any small Kansas town.



The Larned Source Water Protection Area Boundary is shown by the purple line. It includes all of the city of Larned (blue line) and the land adjacent to the Pawnee and Arkansas Rivers upgradient from the wells. The black line shows Zone B of the protection area.

The list of contamination sources for this area is very long and includes nearly everything one would find in any small Kansas town.

In the Kansas Source Water Assessment Program of 2003, Zone C was the area from 2,000 feet to two miles from municipal water wells. In Larned's situation, groundwater flow is most likely in the same direction as the Arkansas River. It was decided that the area more than 2,000 feet to the east likely did not contribute recharge to the wellfield. It was decided that the areas adjacent to the rivers within two miles would be included but much of the



This well on the left side of the photo is protected from vehicle collisions with steel piping, but not from leaks or spills from the nearby storage tank, chemical totes, and un-empty trailer mounted tanks. The steel tank on the right appears to store used motor oil based on the presence of used oil filters on the ground.

remaining area from the assessment would be excluded, especially those areas down gradient. There was one exception to this however, as a arbitrary line through the middle of town would likely be confusing to residents, business owners, etc. Because of this, it was decided to keep all of the land within the city in the protection area. When the Source

Water Protection Area boundary was not also the corporate boundary of the city, the boundary was on a section or quarter-section line.

After compiling the list of potential contaminant sources within the three zones, the source water protection committee of city staff and private citizens agreed that the following were the items of highest concern, ranked in

order of highest to lowest: An illegal well with pesticides and used motor oil stored nearby, salt and/or brine storage at highway maintenance facilities, fertilizer manufacturing, sanitary sewers, railroad derailments and spills, possible sand and gravel pit development, possible abandoned wells and vandalism.

To manage and reduce the risk of the above items, the plan recommends specific actions that should reduce their risk. Although vandalism has not been a problem in the past, crime prevention activities may result in maintaining the water quality and preventing interruptions of the delivery of water. The police department will be asked to learn the locations of the water wells (and other important infrastructure) and to make more patrols to view these assets and any suspicious activities near the wells.

Abandoned wells are recognized as hazards to water quality nearly everywhere. An easy, efficient and effective process to resolve private, abandoned wells has not been developed in Kansas, and probably hasn't anywhere. While no abandoned wells were found in the inventory process, there are likely wells located in basements and backyards that are abandoned or in a state of serious disrepair. Some of the original city wells identified in the Sanborn maps may also be existing. If the recommended source water protection action of creating a community

C
W
E

Clarke Well & Equipment, Inc.

"Groundwater Specialists Since 1952"

**Water Well & Pumps
Sales & Service**

<ul style="list-style-type: none"> ▪ Pump Repair & Installation ▪ Extensive Parts Warehouse ▪ Full Service Machine Shop ▪ Pump Performance Testing ▪ Welding & Backhoe Service 	<ul style="list-style-type: none"> ▪ Test Holes ▪ Production Wells ▪ Well Treatment ▪ Well Video Service ▪ Well House Piping
---	---

Great Bend, KS

www.clarkewell.com

620-793-8493

info@clarkewell.com

foundation is achieved, it might be possible that this fund could be a source of money to fund well plugging when abandoned wells are found.

Sand and gravel extraction was identified as the sixth threat. Sand pits exist south of the wellfield on the opposite side of the Arkansas River. Other pits exist on both sides of the river southwest of town. It is recommended in the plan that zoning or other administrative actions be put in place that would prohibit new sand pits within the protection area. The reason why a sand pit may be a threat is partly because of potential contamination. Removal of silt and fine sand from above and within the aquifer may reduce the natural filtration that groundwater enjoys. Providing a more direct path of water similar to the characteristics of surface water to a well may also cause a determination that a water system's groundwater is now under the direct influence of source water. Such a determination would cause the water system to build a surface water treatment plant or find a new source of water without surface water characteristics.

The fifth identified threat is the railroad that serves the grain elevators and fertilizer plant. While the former Santa Fe railroad does not carry trains from Dodge City to Great Bend and points beyond, the railroad carries the feedstock for fertilizer and also diesel fuel for locomotives. Maintenance of the tracks and the development of spill response plans (which can be shared with the city and emergency response agencies) will be recommended to the railroad.

The fourth threat identified by the committee are the sanitary sewers that serve the homes located in the protection area. Like all underground infrastructure, sewers can break or develop leaks over time and allow sewage to escape or stormwater to enter. Because they are absolutely necessary if homes are allowed to remain near the wells, it is very important to know that they are performing as intended. Kansas Rural

Like all underground infrastructure, sewers can break or develop leaks over time and allow sewage to escape or stormwater to enter.

Water Association works with wastewater systems to locate possible integrity failures with smoke testing. To do this, a large fan, with a special manifold to burn mineral oil, blows smoke into the sewer at a manhole. If the sewers are unbroken, the only place smoke will be seen will be from the plumbing vents on the roofs of houses and other buildings. If there are breaks or uncapped connections, one might find some emerging from lawns, storm sewers, cracks in the street, etc.

The third threat is a locally-owned co-op fertilizer manufacturing or mixing facility near the downtown area. The city will ask the Pawnee

County Emergency Management Department to take the lead in determining that the facility has the proper safeguards and response plans in place to prevent and appropriately respond to spills, fires, etc.

The second threat are the state and county road maintenance facilities. Both shops store liquid deicing compounds, and likely rock salt, on site. The managers of these facilities will be reminded that the release chloride containing deicing compounds could cause serious impacts to the drinking water quality.

The first listed, and most critical potential contaminant source identified, was a water well which was drilled approximately 250 feet away from one of the city's water wells in 2010. The drilling log for the well which was filed with the Kansas Department of Health and Environment by the well driller stated that its use was for domestic purposes. If this were true, there would be no legal remedy to prevent the well from being drilled for the landowner. Both the city well and the "domestic" well are located outside

MA Miller & Associates
CONSULTING ENGINEERS, P.C.

WATER/WASTEWATER:
Design, Treatment, Storage, and Evaluation

SITE DEVELOPMENT:
Platting, Re-Zoning, Grading, and Utility/Pavement Design

ENVIRONMENTAL:
Chemical/Biological Waste Treatment, Phase I & II, and Remediation

SURVEYING:
Topographic, Construction, GPS, and Route Surveys

Main Office:
Miller & Associates
1111 Central Avenue
Kearney, NE 68847
308.234.6456
www.miller-engineers.com

Colby, KS • McCook, NE • Holdrege, NE • Kearney, NE • Grand Island, NE

PROVIDING RESPONSIBLE SOLUTIONS FOR YOUR WATER NEEDS

WELL SERVICES

- Water Supply Systems
- Hydrogeological Services
- Well Drilling & Rehabilitation
- Pump Repair & Maintenance

WELL INSPECTIONS

WATER TREATMENT



WATER · MINERAL · ENERGY

316.264.5365

www.layne.com

Office Locations

- Kansas City, KS
- Wichita, KS
- Omaha, NE
- Kearney, NE
- Oklahoma City, OK
- St. Louis, MO

of the city limits, and even if regulations existed for the city, a legal way to prevent the well from being drilled in the county is not obvious. The business that had the well drilled has never used the well for domestic or household purposes. The business, which does purchase water from the city for its real household purposes, wanted to use water to mix with pesticides in sprayers. These sprayers, some of which were not empty when the survey was completed, were stored next to the “domestic” well. Intermediate Bulk Containers, commonly referred to as totes, and presumably containing pesticide concentrates, were stored next to the “domestic” well. A large steel tank, with used oil filters on the ground nearby, was also nearby, presumably containing used motor oil. A hose used to fill the sprayers, which exited the top of the well, was found laying on the ground.

Because this well is used to fill sprayers, and not for household purposes or for irrigating a lawn, garden or orchard smaller than two acres, its use makes it an industrial well. This use requires a permit to develop a water right, and the water right regulations require this well to be 1,320 feet away from other non-domestic wells, like those used by the city of Larned public water supply system. So, at the location the actual industrial well was drilled, the application for permit to develop a water right would likely be denied.

The illegal well was publicly disclosed at the city council meeting where the plan was adopted. The mayor of Larned moved quickly to meet with the owner of the illegal well just days later. Already, there is a verbal agreement to do what is necessary to rectify the problem.

So what can Larned, and every other water system do to prevent encroachment of domestic wells from being drilled adjacent to municipal wells? The Kansas Water Appropriation Act gives the Chief Engineer in the Kansas Department of

Agriculture all authority to determine how the state’s water is to be appropriated among water users. No city, no rural water district through their county, or anybody (on their own) can restrict who gets to use water except the Chief Engineer. However, the law allows cities to protect the health and safety of their residents and property, and who can argue that a domestic water well drilled into the same aquifer doesn’t pose a threat to a city’s drinking water? The city of Larned’s plan recommends that they work with the city attorney to craft an ordinance that prohibits the drilling of water wells within a reasonable distance of the city’s wells. That distance hasn’t been determined yet, but all of Assessment Area Zone B seems to be a good place to start the discussion.

Kansas Rural Water Association has two staff members who will assist any public water supply system with the development of a written source water protection plan. There is no charge for the assistance. These unique plans give the water system staff, administration, customers, other neighbors and assistance providers a comprehensive and usable explanation of the system, the potential hazards and recommended actions to implement greater protection of the water quality and quantity. The Larned example shows that increasingly safer source water can be achieved one step at a time. And whether you have a source water protection plan or not, consider how your system might keep private wells from being drilled in the wellfield, and potentially introducing contaminants, into your system’s source water. Give KRWA a call; we are ready, willing and able to help.

Douglas S. Helmke has been the Water Rights Tech at KRWA since June 2000, and also a Wellhead / Sourcewater Protection Tech since 2003. He holds professional geologist certification in Kansas and Missouri. Doug



received a bachelor degree in geology from Kansas State University.