THE SPIGOT
from the NORTH DAKOTA RURAL WATER SYSTEMS ASSOCIATION

Drip, Drip, Drip

New Technology Helps Locate Costly Leaks In Water Infrastructure

The U.S. Geological Survey estimates 1.7 trillion gallons of water are wasted every year due to water main breaks and other leaks, enough water to provide the country's top 10 populated cities with clean water for one year. The federal government estimates water loss from water main breaks is worth about $2.6 billion dollars annually. Even a quarter-inch hole in a pipe can result in a loss of more than four million gallons of water a year. Water loss in some North Dakota systems are routinely as high as 40 percent.

Bringing safe drinking water to everyone comes at a cost to water utilities. Operational inefficiencies have a huge impact on the price a customer pays for water each month. Water that leaks out of the system without going through a meter (non-revenue producing water) increases the final price customers pay at the tap. Finding those leaks is in no way easy or an exact science, it is time consuming and complex.

To aid systems in finding lost water/leaks, North Dakota Rural Water Systems Association (NDRWSA) acquired an Acoustic Leak Correlator through donations and assistance from a grant through the North Dakota Department of Environmental Quality (NDDEQ) Drinking Water State Revolving Fund. The NDDEQ saw the equipment as an investment to ensure operational stability for not only current borrowers, but future borrowers as well.

Sewerin's SeCorrPhon AC 200 is a multi-functional leak detection device. Water escaping from a leak causes the material in the pipeline to vibrate. These vibrations travel along the pipe and can be picked up as structure-borne noise, even at distant contact points, for example, fittings. The vibrations also travel through the ground up to the earth's surface as ground-borne noise, albeit heavily muted. The SeCorrPhon system assists in detecting leaks by making the vibrations audible to the human ear. It records those sounds and displays the volume and frequency spectrum as a graph.

Locating a leak with a correlator involves simultaneously measuring the noises caused by a leak on the pipeline at two locations (e.g. on valves or hydrants). Highly sensitive microphones record the noises on the fittings and radio transmitters transmit the signals to a receiver. The correlator then determines the run time difference, i.e. the time lag, between the noises reaching the two measuring points. The correlator calculates the exact leak position using known information such as pipeline length between the transmitters, the pipe material and pipe diameter. Other factors utilities must always consider when performing a leak detection are water pressure, soil type, depth of pipe, and type of ground cover in the surrounding area.

Limiting the excavation footprint on Highway 18 saved on repair expenses.

The correlator is a great tool when conditions are right, but it is not a cure all and does have some limitations. The distance to correlate is totally dependent on the size of the pipe and pipe material. Cast iron carries sound well, close to 1,000 feet. Plastic pipe, which tends to absorb the sound, needs to be correlated at shorter distances.

The correlator has already been a great asset to many water utilities in North Dakota. The city of Larimore was experiencing an 80,000 gallon a day leak, or 60 percent of the city's total water use. City employees had been trying to locate the leak for months. In 2019, Larimore began purchasing drinking water from the East Central Regional Water District. All water entering the city's distribution needed to be paid for, this included water from leaks. To continue paying for the excess volume could have financially crippled the city.

One of the first steps the city took in identifying the leak was to inspect the sanitary sewer system. The city opened manholes and looked for any unusually high flows in the system. The city discovered it had been paying for water that was leaking into its own sewer system and were able to isolate the leak to a single city block. Unfortunately, Larimore could not determine where to precisely dig to repair the leak.

Traditional leak detection methods did not point directly to any signs or sounds of a leak. Other than using NDRWSA's correlator,

MEET the Newest Members of the Team

Chuck Mischel of ND Rural Water utilizing leak correlation equipment to pinpoint a utilities water leak.

This leak was found on an abandoned lead service line.

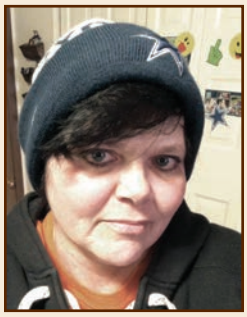
the only way to find the leak would be to excavate along the water line of the whole city block. Excessive excavation increases the cost to repair leaks and causes unnecessary damage to roads (Highway 18). Using the correlator, NDRWSA staff was able to locate the massive leak within a 10-foot radius. The leak was the result of an abandoned lead service line that was leaking more than 100 feet from the water main and almost directly into the sanitary sewer.

Water systems can contact NDRWSA via its website, www.ndrw.org, to find out if the leak correlator could benefit their system.

North Dakota Rural Water Systems Association (NDRWSA) has hired three new employees in the past year. All three are native North Dakotans and truly enjoy their new jobs, helping others from around the state.

The Wastewater Circuit Rider, **Keith Hegney**, was hired in May 2019. Prior to accepting the position with NDRWSA, Hegney was employed as the Public Works Director with the City of Surrey. During that time, he was heavily involved in the erection of a new water tower, installation of new water lines, and installation and replacement of gate valves and fire hydrants. As a public works director, he gained extensive knowledge of modern principles, methods, practices, and materials in planning, designing, operating, and maintaining public works services. Hegney lives in Surrey with his future wife, Jenny. He has three children and two bonus children. In his free time, he enjoys relaxing at the lake, hunting, fishing, and spending quality time with family and friends.

Nathan Olmsted has been with NDRWSA since August 1, 2019. Olmsted served as the City Superintendent for the City of Wyndmere for three years prior to becoming the Eastern Circuit Rider for NDRWSA. He brought with him knowledge of water and sanitary sewer systems. Nathan enjoys helping people with problems that are encountered in rural water districts and municipalities. Olmsted graduated from North Dakota State College of Science with a degree in Automotive Technology and uses his passion for cars in working on his 1974 Dodge Challenger. He also spends his free time hunting and fishing. He currently lives in Wyndmere with his son, Hayden.



Julie Hein joined the team in December 2019 as the new Source Water Protection Specialist for NDRWSA. Julie lives in Wing. She is currently the mayor of Wing and manages the Wing Theatre. She has three grown children and six grandchildren. Hein is a retired science teacher with a bachelor of science degree in the natural sciences and a master of science degree in administration, both from the University of Mary. She taught science for 25 years before deciding she needed a new direction in life and being the Source Water Protection Specialist fit the bill. Hein gets to do science now, instead of just teaching it. In her spare time, she enjoys reading, quilting and junking for antiques.

Hegney, Olmsted and Hein are great assets to the NDRWSA. They are dedicated to their profession and to the water industry. You can find them out on the road, helping municipalities and rural water districts whenever a problem arises. Whether it's water leaks, lagoon issues or helping with consumer confidence reports, our new field staff has the expertise to assist.