

Small system challenges: low supply capacity and aging infrastructure has Damar, KS facing improvements

The small town of Damar, Kansas, population 144, is planning to make major improvements to its distribution system. This coming summer, the city hopes to begin installation of an all-new water distribution system and valving for better control. The city also plans to camera all sewer mains for defects and possible recent damage caused when making recent repairs to waterlines.

Damar relied on several wells in the city up to the early 1990s. The city's wells produced 50 to 80 gpm. However, due to the reduced drinking water standard of 10 ppm for nitrate, the city was forced to either acquire a new source or build a nitrate removal plant. Located in western Rooks County in northwest Kansas, the city determined that the quickest and most economical alternative was to interconnect with Rooks County RWD 3. However, when Rooks RWD 3 was being proposed, designed and financed, the city of Damar was not included in the project. Therefore the capacity to provide service to the city has been marginal, but serviceable.

Damar's storage capacity consists of a 9,000-gallon underground reservoir and a 10 x 90-foot standpipe. The storage total is 61,876 gallons. Damar is able to receive about 18 gpm from Rooks RWD 3. The flow rate varies from 10 gpm to 22 gpm depending on the demand in the RWD. Occasionally, when the RWD has a break or other problem, Damar receives no flow.

With such a low supply, any major usage or leak can cause a "water crisis" in the city. Days can go by before the city is able to replenish its storage and restore normal operating pressures. Most citizens in Damar know this and understand that's how it has to work. They have adjusted by not watering lawns or watering large gardens; they wait to wash their vehicles until they travel to a neighboring city; they all use water in their homes as sparingly as possible. Water use in Damar averaged 103 gallons per capita per day (gpcd) from 2002 to 2006. The regional average is 156 gpcd.

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The local school district would open the doors to the high school in Palco for Damar residents to shower while they had no water to their homes; Damar would furnish bottled water for drinking and cooking.

Just before Christmas 2006, Damar Mayor Brian Newell contacted me in the morning to report the city was receiving 18 gpm but the standpipe had lost 20 feet of storage and the water level was still dropping. Brian suspected there was a leak but no leak had surfaced. I arrived 90 minutes after his call. The water pressure had dropped from 45

to 32 psi. We began leak detection work from north to south, listening to meters and fire hydrants with KRWA's sonic detection equipment. On the very southeast edge of town I finally detected the leak but I was unable to pinpoint it. It appeared to be on a block long stretch of a 2-inch galvanized line; the leak was estimated at 10 gpm. After several hours of listening to the street with a ground mic and probing, I decided that we should excavate over the suspect line to better identify the leak. We excavated and inserted a new valve to isolate this line. By now, the leak had stopped as the water pressure was down to 17 psi. The condition of the 2-inch galvanized line was very poor. We decided to install a temporary service to the one affected user until a new line could be bored. By the next day, system pressure had recovered to 45 psi; a boil order was issued until samples proved the water quality was acceptable.

With the system back to a more normal state, things seemed to be operating satisfactorily. That was the case until December 31 when the Mayor called again to report that the water system was without pressure. I arrived in Damar 90 minutes later. With no pressure to work with to try to detect leakage, the only reasonable approach was to shut all valves and then open them one by one. With only 18 gpm of

incoming supply, this process would require time. Operator Linus Phannenstiel and I checked sewer mains in case the leak was flowing into the sewer rather than surfacing. Linus detected flow in the sewer in a section of the town. Listening to water meters in the vicinity, we were able to detect the leak. We were able to pinpoint the leak under payment. During that excavation, we found that frost had penetrated to 22 inches. The 2-inch cast iron main had a shear crack which was likely due to shifting soil caused by the frost.

Damar's water system functioned as normally as possible until just before Labor Day 2007. The supplying rural water district had a leak that reduced the flow to just a few gallons per minute. For several days, Damar had no more than 30 psi until the district repaired the break. Again, it required several days for Damar to recover its storage.

The third recent service outage occurred December 7, 2007. Mayor Brian Newell called early that morning and requested assistance because Damar was completely out of water and had been so overnight. I told him it would be about 90 minutes and I'd be there. Brian said he'd drive around town to check for leaks and also check sewer manholes for flows.

Stockton hauls from Palco

When I arrived, the city of Stockton was already hauling water from Palco to Damar with their new supply truck with about 1,500 gallons per load. Operator Linus Phannenstiel had located a large sewer flow a block north of the standpipe and reservoir going east toward the lagoons. The valves for isolation for this part of the system



Several different types of leak detection equipment are utilized by KRWA staff. This photo shows KRWA Tech Doug Guenther using a sonic listening device to pinpoint the location of water escaping from a service line.

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were just across the street from this intersection and were closed but when opened, the pressure was immediately lost. This indicated that the leak was in between the standpipe and the north side of this intersection. While waiting for the 18 gpm to help build pressure and another load of water from Palco, I hit the pavement with my sledgehammer along where the main was running north and south. It sounded hollow below. I asked Brian if he had a hammer drill to drill a probe hole; the first probe brought up mud. After excavating, we found a 4-inch main with a complete break. The leak was directly over the sewer main. The map indicated a 6-inch cast iron main was here so a full circle clamp was borrowed from Hill City to make the repair. By 4 p.m. water pressure had returned to 30 psi and by noon the next day, Damar's system was at 45 psi thanks to Stockton hauling water from Palco.

I know that this may seem to be a rather long and detailed explanation of one small town's problems. My purpose in writing it is because there are many other small towns and RWDs that have similar problems and experiences. It is good to see that Damar is planning to address the aging distribution system.

USDA Rural Development has obligated \$500,690 for funding a replacement water system in Damar. According to Dave Barber, Area Specialist at the Hays' USDA Office, the funding will consist of a \$309,690 loan and a \$191,000 grant. The project will include approximately 7,100 linear feet of new distribution system and appurtenances. The project consultant is Thaniel Monack, BG Consultants, Manhattan, KS. Yes, the city will need to increase rates because of the new loan. Sometimes there are no easy or cost-free fixes. Having a reliable water system is essential. Damar is making that investment. Damar is also looking forward to constructing their new KAN STEP Community Center. That will be a volunteer effort – and I'm confident that it will be exemplary of how the people in the community work and pull together. It's a pleasure to work with communities such as Damar.

Doug Guenther has worked as Technical Assistant for KRWA for 11 years. Doug worked for the city of Oakley in the Water and Electric Department for 8 years. He has also worked several years for an industry supplier. He is a Class II Certified Water Operator.

