


## Utility2Utility: Empire District

[Kathleen Wolf Davis](#) [1]

 [Empire-Electric-in-action-pole MD.jpg](#) [2]

For this installment of our Utility2Utility interview series, we chat with Line Operations Manager Wes Robertson about the problems that come from old cable.

The Empire District Electric Company is an investor-owned utility providing electric, natural gas and water service to approximately 215,000 customers in Missouri, Kansas, Oklahoma and Arkansas.

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### **Tell us about the reliability issues you were having with old cable.**

Robertson: We started underground in the mid to late 1970s when we started to direct bury outside concentric cable. That 1970s cable only had a 25-year life expectancy, plus the installation method we used back then shortened the life even more.

Our terrain is very rocky, and we bedded the cable with agricultural limestone. Over time, this limestone works into the insulation, and the only protection then was semicon. The semicon is the rubber covering the actual insulation, which is still employed today, but, unlike the URD cable of the 1970s, today's electrical cable has a hard plastic covering over the wire. This rocky terrain makes it extremely hard to dig up and repair or replace cable, and it caused terrible problems. Plus, when we replace cable we have to dig a second trench to install the new cable.

In the late '80s, we started installing jacketed wire in PVC conduit, but we still have lots of direct bury cable out there.

### **What was the final straw that got you thinking about injection?**

Robertson: The main "straw" was an accelerating rate of failure. We knew we were going to have to do something. We did have to replace some cable, but we've actually been able to inject instead for the most part. In 2000 and 2006, we injected about 30,000 feet of cable total. We have only had one failure in this cable. Without injection, we estimate we would have had 150 failures. This proved to us that cable injection work. Injection has given our

cable a second life and saved us untold amounts of money and headache.

### **Tell us about the process of injecting. What does that involve?**

Robertson: Cable rejuvenation is the injection of a healing and upgrading fluid into the strands of medium-voltage power cable to repair and extend the life of aging cable. The rejuvenation fluid migrates into the conductor shield and the insulation, modifying the chemistry of the insulation and extending cable life. The dielectric strength of the cable increases immediately and will exceed 400 volts/mil within seven days of sustained pressure rejuvenation.

Over the last 30 years, circuit owners have rejuvenated more than 150 million feet of medium-voltage power cables. Of all these cables, less than one percent has failed in service. Most of our cable is unjacketed, 1970s vintage cable, which is the most commonly injected today.

In terms of timing, the process is fairly quick. On a typical residential, 300-foot 1/0 segment, injection takes less than two (2) hours, including the switching, craft work, and injection. On looped systems, or where primary jumpers can be utilized, there is no outage required.

### **What benefits have you seen from this project?**

Robertson: We were seeing 75-80 failures annually before we started injecting. Some years, we even saw more than 80 failures. Now, we are seeing 10-12 failures a year. Every year of injection cuts our cable failure rate in half. Currently, we are injecting some cable with more than 50% corrosion of the concentric neutral and having good results. On average we are now injecting 15,000 feet of cable each year.

One subdivision of approximately 350 homes, known as The Riverside Estates, was faulting constantly before injection—and experiencing half of those 80 failures mentioned earlier mostly in the summer months of June through August. We believe most of the failures were the result of the ground getting very dry in those months, which causes considerable shifting of the earth. Once we performed the injection, we went from 40 failures to zero. We started with this particular subdivision because it had such a high failure rate. At first it was hard to believe that you could inject this fluid from one end to the other, but we decided to try it because we really had nothing to lose. Replacement is very expensive and the constant failures were very troublesome to our customers. After injection, the subdivision hasn't experienced any faults.

Most importantly, cable injection is typically less than one-half the cost of replacement, and the economics almost always favor rejuvenation over replacement. Our customers are happy and it's amazing to get another 25+ years out of a cable that has already given you the 25-30 years it was originally guaranteed to last. And with the guarantees provided by our injection company supplier, we are now providing the best reliability. Cable rejuvenation is another tool in our box of options for guaranteeing reliable electrical service, just as much so as tree trimming and pole changes.

### **What did you learn from this process?**

Robertson: This project with Novinium has made me a believer in cable injection. I was

impressed with the very first cable injection. I really didn't think you could put a vacuum on a cable and pull through a cable in this way, but I was proven wrong. It's a valuable tool and needs to be a big part of our reliability program going forward—one of the tools we need to use system-wide, I say “This is just as important as replacing poles and it helps us to be more proactive rather than reactive.”

### What advice would you give other utilities looking to replace a lot of old cable?

Robertson: First, look at your terrain. This is really a terrain issue. That's what makes replacement so expensive for us. So, other utilities may not see the extreme cost savings we have with injection. Of course, those with similar or even more rugged terrain could see a big jump in savings, too.

But, bottom line, I'd say, “Give cable injection a try.” If you're reluctant, try a small amount first. Inject it and see for yourself. I'd challenge any operations person with 25-30-year-old URD cable to try injection. And I wouldn't hesitate to talk to any operations person about our success with cable injection. They should give me a call.

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