

# Restoring Lines to Keep Service Reliable

Old underground power lines get a new life. **Dave Guzniczak**

**C**an old underground (UG) power lines be given new life at a reasonable cost so they can continue providing reliable service to Great Lakes Energy members for years to come?

The cooperative's engineering department is optimistic the answer will be "yes," following the completion last fall of a pilot project at two locations in Antrim and Charlevoix counties. It involved a line restoration process developed by Novinium, a Seattle area-based company specializing in UG cable rejuvenation products and services. Its clients include investor-owned utilities and other electric cooperatives.

"After carefully reviewing project costs, we expect our investment in restoring these underground lines is much less than replacement costs in the future," explains Justin Chase, electrical engineer. "The difference could amount to tens of thousands of dollars in savings."

In addition to cost savings, the restoration of UG lines will help ensure many more years of reliability for Great Lakes Energy members. Underground lines are more difficult to repair or replace, and thus more expensive.

A three-quarter mile span under Intermediate Lake in Central Lake was selected for the pilot project, along with shorter UG spans at the Barnard substation south of Charlevoix that go under a highway. The lines have all exceeded their 30-year estimated lifespan, but have not yet posed any serious reliability concerns. Because they're located under a lake and highway, their replacement costs would have been significantly higher than normal.

"We selected these locations based on where the most members would benefit from the pilot project with the least amount of interruption to their service," Chase adds.

Over time, microscopic cracks can develop in the UG cable insulation that can lead to cable failure. Resembling tree shapes, the cracks are typically created by moisture in the cable's core and eventually break down the insulation. Once the insulation has become weak and no longer insulates the energized core from the outer neutral wires, a resulting



Photo - Gus Paz

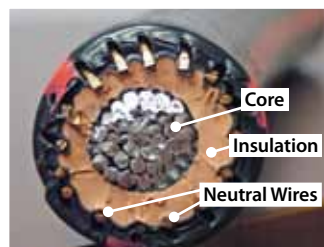


Photo - Dave Guzniczak

Above, a silicone-based compound is used to restore three underground cables that deliver power to some Great Lakes Energy members in Antrim County. The small photo at left shows the cross-section of a cable.

short circuit (arcing) will cause an outage.

After Great Lakes Energy crews safely de-energized the lines, a two-man team hired by Novinium injected a silicone-based compound into the cable cores to restore the insulation. The compound is a nonflammable, non-hazardous fluid.

It took about three days and 24 gallons of compound (8 gallons per cable) for the rejuvenating fluid to permeate the three submerged lines along the three-quarter mile section. Any moisture between the core and insulation was replaced by the fluid. The entire project at both locations took about two weeks and is expected to add another 40 years to the life of the UG lines.

"If this process is as successful as we anticipate, it will be like having new underground wires installed at approximately half the cost," says system engineer, Gus Paz.

The pressurized injection method will

not work with every type of UG cable that the cooperative has in use. The rejuvenating compound cannot penetrate UG cables with a solid metal core that are typically found in subdivisions and strand-filled cables containing a tar-like substance. Cables with many splices or badly corroded neutral wires are also not recommended for this process.

What happens if outages should occur on the rejuvenated lines as a result of insulation breakdown that the Novinium process is warranted to prevent? Under a 40-year warranty, Great Lakes Energy would be reimbursed for its costs to have the lines rejuvenated again.

The rejuvenated lines will be monitored in the months ahead to determine future use of this technology in other areas. Co-op staff will continue to research and pilot innovative technologies that can improve service reliability and reduce costs.