By David Southern

frequency hopping for CORROSION PROTECTION

Cathodic protection (CP) systems for storage tanks, pipes and other buried infrastructure are often located in remote locations, making them difficult to maintain and operate, let alone at peak performance. In some cases, unauthorized third parties strip the critical rectifiers and wiring and sell them for scrap, leaving tanks and miles of expensive metal unprotected. Theft results in an increased risk of damage—even total failure—of a system from corrosion. Compounding operational difficulties of remote systems are site access issues stemming from land use disputes, Homeland Security and urban sprawl.

Corroding Infrastructure

The cost of implementing properly installed and well-maintained CP remote monitoring equipment pales in comparison to the annual costs required to repair even a single leak. Reports estimate that corrosion is responsible for costing the nation's water and wastewater industry tens of billions of dollars per year. The desire to reign in those costs has never been greater. Corrosion leading to leaks, lost revenue, groundwater contamination and other adverse scenarios affecting overall water quality, supply or public safety can now be prevented like never before because of technological advances in the remote monitoring of critical tanks, pipes and casings.

Overcoming the land use, security and urban sprawl challenges of remote monitoring using new communication technology

Since the 1800s, when the first metal pipe was buried in North America, roughly 2.3 million miles of pipe and corresponding valves, tanks, vaults and structures were buried to carry vital water supplies across the country. Much of this buried infrastructure now celebrates its 50th year, and some is beginning to show its age after a few recent and tragic events.

Site access issues stemming from land use disputes, Homeland Security and urban sprawl further compound operational difficulties for remote systems. Recent tragic international events led many landowners, municipalities and governments to restrict access to sensitive areas, making them very difficult to enter. Many airports, office towers and mass transit sites are now "off ls" for routine CP maintenance checks. Restrictive site access procedures leave miles of buried infrastructure unmonitored and sometimes unprotected.

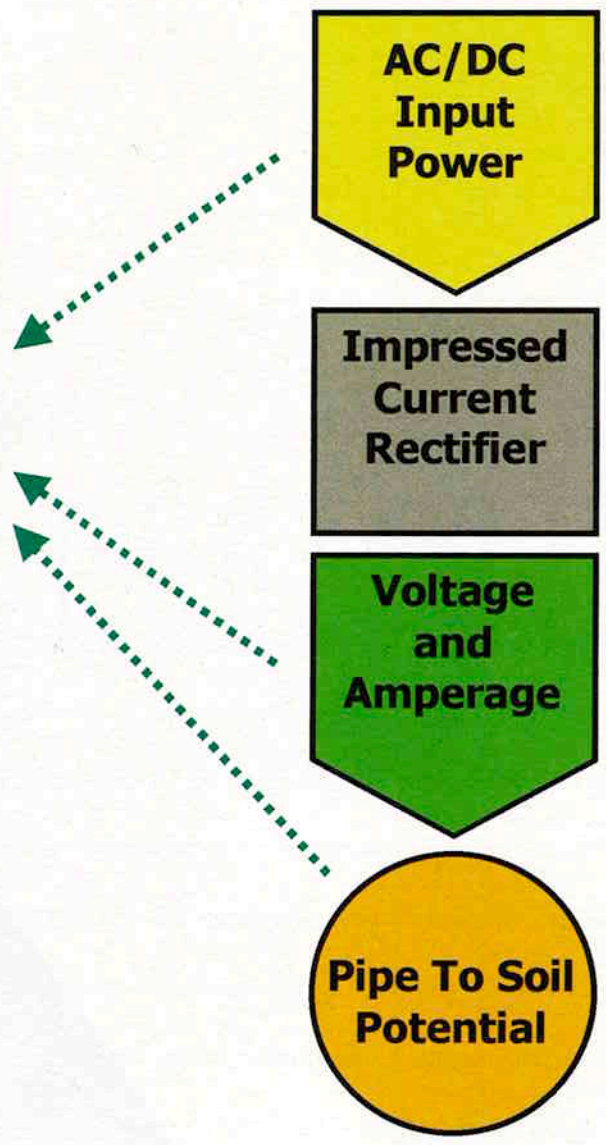
Rising energy, steel and labor costs add to operating budget shortfalls. The cost of repairing or replacing buried metal assets steadily rose more than 300% over the last 10 years and is projected to continue increasing.

A New Advancement

A large municipal water company recently deployed a new advancement in spread spectrum wireless data communication technology, which holds the promise of robust, cost-effective remote monitoring with no licensing fees, no recurring fees, no complex legal contracts and maximum network security—safe behind the firewall.

This technology, developed in the 1930s, is known as a frequency hopping spread spectrum (FHSS) and is based on the concept that most radio frequencies are underutilized. An FHSS allows multiple users to simultaneously operate across a spectrum of radio frequencies. Provided all radios within the data communication network operate at the same frequency and then all hop to new frequencies at the same time and in the same pattern, effective, safe and trouble-free data communications exist.

An analogy of FHSS technology can be illustrated by imagining a group of people wishing to carry on a conversation using citizen band (CB) radios. As long as all parties are on



the same channel, they can communicate; if they wish to keep others out of their conversation, they all may carry on a private conversation by agreeing to move from channel to channel on a random pattern. As long as all parties hop channels on the same pattern and at the same time, they can carry on an effective conversation. If they take roll call upon arrival at the new channel, they can further improve communication security. In some remote cases where a third party does hit the current CB channel at the right time, the third party only gets part of the message, which means little.

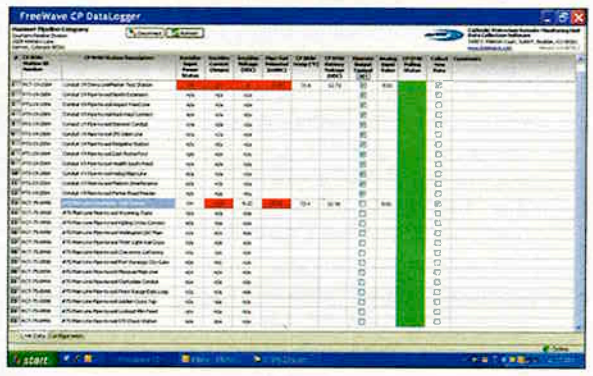
Key advantages of this new technology, as applied to remote monitoring, are as follows:

- No monthly recurring fees or costs;
- No initial or monthly licensing fees;
- No lengthy legal contracts;
- Minimized network interferences;
- Maximum network security;
- Operates behind company firewall;
- Ownership of your data;
- Open protocol communications;
- Maximum system flexibility;
- Infinite repeatability;
- Maximum implementation into cabinetry; and
- Minimized field wiring.

The new FHSS wireless CP remote monitor units (RMUs) automatically monitor and report key corrosion protection activities including: pipe-to-doil potential, rectifier output, voltage rectifier output amperage, rectifier input power status, critical bonds interference points and interruption control. Modern CP RMUs monitor ambient temperature and, if connected to a solar power generation system, also will monitor the backup battery supply voltage.

The new FHSS wireless field-located CP RMUs remotely monitor and record rectifier and pipe-to-soil voltages, currents and potentials. Field data is then wirelessly collected from the field devices by a computer located in a central office or through a SCADA system for CP operator evaluation and monitoring. Many companies already own and operate a SCADA network. For companies that do not have SCADA, staff can deploy low-cost data logging software readily available for less than the cost of a desktop computer. Figure 1 is an example of this new CP data logging software.

Figure 1: CP data logging software.



Central data collection systems automatically inform CP professionals of immediate system operation requirements leading to optimization in keeping critical CP equipment online and operating within guidelines. Remote sites then become easy to monitor. WWD

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