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# BEATING BACK THE BUGS

**One small company unleashes the latest technology to prevent concrete degradation in manholes, and it pays off big with increased business, productivity and profit**

By Dan Heim

The existence of bacteria that can eat concrete sounds like science fiction to the average person, but professionals in the wastewater business know it as science fact. Bacteria that breed in sewers can produce corrosive compounds that literally dissolve pipes.

Traditional preventive measures include the injection of chemicals (potassium permanganate, chlorine and oxygen), an expensive and temporary solution at best. Protective coatings, troweled on manually, depend on the quality of application for their effectiveness — even a pinhole leak will allow bacterial infiltration.

When Don McDowell, president and owner of Southwest Environmental Testing (SWET) Inc., learned of a better system, he saw the opportunity to secure a significant niche in the market and expand his business.

McDowell invested in a spray-on epoxy manhole lining system that became a substantial contributor to the business. Added to the company's pipe inspection, pipe cleaning, hydroexcavation, air testing and leak location services, the manhole lining operation contributed profits that have helped the company expand its scope and explore expansion of its geographic base.

(ADEQ) had recently changed its requirements for manhole testing. Believing that the existing "standing water" method wasn't sufficiently reliable, the agency began to require vacuum testing. Not surprisingly, there was a gap between supply and demand for vacuum testing companies, and SWET took advantage.

McDowell took over the company in 1999. For the first year, vacuum testing was nearly all he did, but he did a lot of it — so much that he soon found himself with enough cash to expand into other services.

His first major investment was in two Vac-Con combination sewer cleaning trucks. "That decision got me a few sleepless nights," McDowell recalls. "I mean, we were talking a quarter-million dollars there. It was a big step, but I knew there was a need for those trucks. Contractors often had a two- or three-week wait to get one onsite."

As it turned out, the strategy of identifying a need, then adapting or expanding to fill it, has been key to SWET's success. A year later, after identifying a need for video inspection services, McDowell added a camera van from RS Technical Services. Most recently, in 2005, that strategy led McDowell to consider the new spray-on manhole lining system.



The bright, highly reflective blue epoxy coating nears the top of a manhole.

## Strategy for growth

SWET was founded in 1998 by McDowell's father-in-law. The Arizona Department of Environmental Quality

Working from the bottom up, SWET technician Lalo Orozco applies the first coat of epoxy to a manhole undergoing rehabilitation. (Photography by Dan Heim)



## PROFILE

### SOUTHWEST ENVIRONMENTAL TESTING INC., PHOENIX, ARIZ.

OWNER:	Don McDowell
YEARS IN BUSINESS:	6
SERVICE AREA:	Statewide
SERVICES:	Vacuum testing, epoxy coating and structural rehabilitation, hydroexcavation, pipe cleaning, pipe inspection, air testing and leak location
EMPLOYEES:	20
WEB SITE:	<a href="http://www.swetinc.com">www.swetinc.com</a>



## Thiobacillus blues

In 1965, biologist C.D. Parker published a seminal paper on microbial induced corrosion (MIC). His research identified the cause of concrete breakdown in sewers. It was not a "corrosive gas problem," as commonly thought. The culprit was a bacterium known as *Thiobacillus*. Common anaerobic bacteria multiply in raw sewage and excrete hydrogen sulfide (H<sub>2</sub>S) gas. *Thiobacillus* has the unique ability to metabolize hydrogen sulfide, in the presence of oxygen, into sulfuric acid. Sulfuric acid is an extremely caustic compound, and it will dissolve concrete.

The problem is exacerbated where turbulence causes mixing, as in lift stations and manholes. This is usually where corrosion problems surface. An

untreated manhole will show signs of corrosion in only a few years of use, and it will eventually fail.

The vast majority of wastewater systems in the United States use concrete for pipes and manholes. Code jurisdictions increasingly require greater durability in newly installed manholes. In an attempt to avoid MIC entirely, manufacturers are experimenting with new, more inert manhole materials, including fiberglass, plastic and ceramics.

## Better way

For four years, SWET had been using traditional troweled-on coatings for rehabilitative and new-manhole work. When McDowell heard about the spray-on epoxy system, he was intrigued by the possibility of improving the

## Chemical Logistics



Four 55-gallon drums of epoxy coating — three base and one hardener — wait on a pallet for pickup.

The chemicals needed for the lining system used by Southwest Environmental Testing are delivered by FedEx in 55-gallon steel barrels fitted with interior liners. The product originates in Tulsa, Okla., but Border Marketing, representative for manufacturer Raven Lining Systems, takes care of the delivery logistics and ensures that the product is at SWET when needed.

One drum kit consists of four barrels (three base and one hardener) that are mixed in a 3:1 ratio during application. Each kit covers, on average, 160 vertical feet of 5-foot-diameter manhole.

Don McDowell, owner of SWET, likes to keep three kits in the pipeline: one in the van, one back at the shop and one on order. "If you don't have the product on tap, you're shut down," McDowell says. "So we just budget for it accordingly."

The steel drums, when emptied, require no special cleaning or treatment because of their interior liner. The product is environmentally friendly. Most of the time, the drums can be given away or sold.

quality of treatment while also increasing productivity.

The product, marketed by Raven Lining Systems since the mid-1980s, required a significant investment in equipment and training and had taken some time to prove its efficacy. For the past 10 years, manufacturer's representatives had been educating and lobbying municipalities to change their specifications and require the spray-on system.

After weighing the risks and benefits, McDowell decided to adopt that system.

He got in on the ground floor, with no competitors. "You know, I think it just came down to my doing my homework, trusting my intuition, and being willing to take a risk," he says. It seems so far that his intuition was right.

The product McDowell chose to address MIC is a binary epoxy sealant known as Raven 405. It is mechanically and chemically similar to other manhole sealants, but the application method is different.

Both epoxy components are heated to



This close-up shows a section of bad concrete that broke from the side of a manhole. Note the epoxy's surface penetration and solid adhesion.

140 degrees F before mixing, and that temperature is maintained by a hot-water jacket surrounding most of the length of the hose used for application. Pressurized to 3,000 psi, the components are mixed in a fitting just before they reach the nozzle. McDowell finds that spray-on makes it easy to build the specified uniform 0.125-inch thickness, provides effective penetration and adhesion on rough or irregular surfaces, and is five to six times faster, depending on the crew's experience.

Surface preparation generally involves high-pressure water cleaning, as the surface must be fresh and porous for good adhesion. Two or three coats typically build the material to the specified thickness. Curing time is one to six hours, depending on ambient temperature.

Below, SWET's Raven van carries a three-man crew, the minimum required for the epoxy system. Inset photo: A hot-water jacket (dark blue sleeve on hose) keeps both epoxy compounds at the requisite temperature until they reach the mixing valve.

Curing is followed by a spark test to find pinhole leaks, since even the tiniest pinhole is like a manhole to a bacterium. In McDowell's experience, leaks are rare. After testing, the manhole can be put into service.

Not surprisingly, a full "moon suit" (including respirator) and street-level tripod system are required for spray technicians. A high-capacity blower mounted on an adjacent manhole pulls fresh air down into the work area. Air quality in the confined space is monitored electronically and continuously.

### Gearing up

Typically, the entire application system comes as a turnkey custom truck, including generator, compressor, water bath heater, mixer and hose. Because McDowell already had a spare truck of the right size, he arranged to retrofit it with the lining equipment to save on cost.

Concurrently with the truck build, McDowell sent three of his crew for a



"You know, I think it just came down to my doing my homework, trusting my intuition, and being willing to take a risk."

Don McDowell



six-day training and certification course given by the manufacturer. A minimum crew of three (only one of whom works in the confined space) is required for licensed application.

The final step was getting product into the pipeline. Vicky McGhee of Border Marketing Inc., a local manufacturer's representative for Raven Lining, ensures that product is there when needed, advises on quantities and scheduling, and takes care of shipping. She also meets with local municipal engineers and inspectors to lobby for specification changes that enable the product's use.

As a result, municipal engineers and inspectors increasingly write the system into their specifications. When a municipality adopts the specifications, that generates business for SWET. Housing development and population growth rates are high in the Phoenix area, ensuring a steady stream of new manholes and work orders.

"If we didn't have this rate of development, I'd put my money elsewhere," McDowell notes, "but the way things are going, I've paid for my investment in this system within the first year."

#### Lessons learned

The manhole lining system typifies SWET's growth pattern of identifying a



Don McDowell looks on as operations manager Tom Van Duinen checks the pumping system. This is where the epoxy components get their final heating and pressurization.

**"If we didn't have this rate of development, I'd put my money elsewhere, but the way things are going, I've paid for my investment in this system within the first year."**

**Don McDowell**

need and being first to fill it. What started as a one-man company now fields 20 employees. Another key has been to

establish a reputation for prompt, quality service.

"You've got to be there for the cus-

tomers when they need you," says McDowell. "They don't want two-week lead times. I've never charged extra for holiday or night work. I never, ever, say no to a customer. They know they can count on me to be there."

Innovation is also critical. "Unless you're satisfied with the status quo, you really need to stay on top of new products and methods," McDowell says. Doing homework, visiting trade shows, reading trade journals, and taking responsibility for education are other components of a competitive advantage, he observes.

Adding the lining system has boosted SWET's bottom line, and the company is poised to take advantage of continuing growth around the state. In fact, McDowell is considering adding a second van based out of a planned Tucson office in the near future. For such a young company, growth in manhole lining has been an exciting experience that has built confidence as well as the bankroll. ■

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