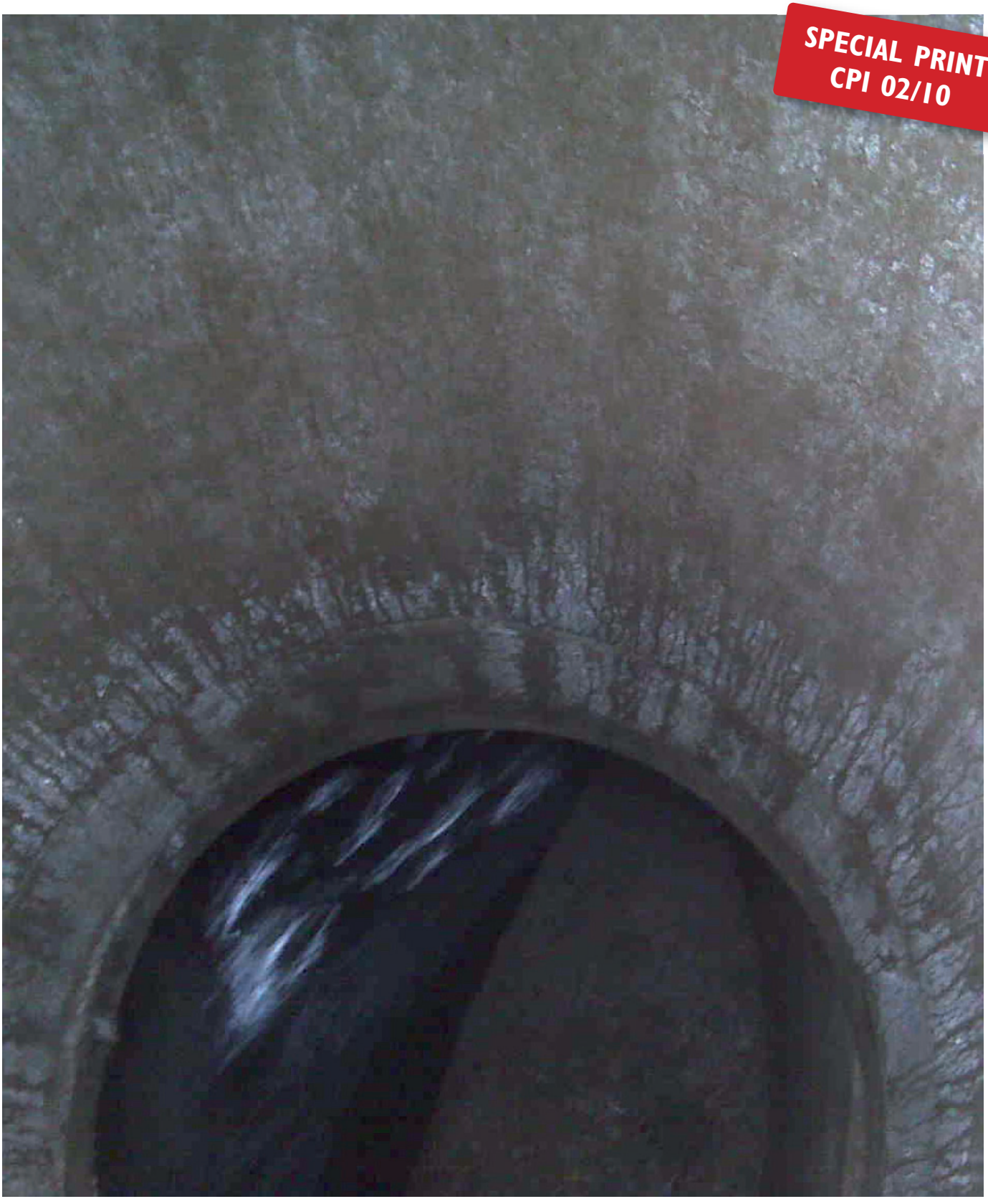
Concrete Plant International

April 2011 2

SPECIAL PRINT | CONCRETE PIPES AND MANHOLES

Anti-microbial additive provides corrosion protection for concrete in Canadian wastewater systems



ConShield, Atlanta, 30318, USA

Anti-microbial additive provides corrosion protection for concrete in Canadian wastewater systems

Microbiologically Induced Corrosion (MIC) in sanitary sewer systems is a problem around the world and Canada is no exception. But in recent years, Canadian engineering firms, municipalities, and concrete producers have begun to test and specify ConShield, an antimicrobial additive that provides permanent protection against Thiobacillus bacteria. The preliminary results are promising.

Manhole in London

Conditions common in wastewater systems - warm temperatures, organic matter, turbulence, and low oxygen levels – generate hydrogen sulfide gas, which promotes Thiobacillus colonization. The colonies live by digesting hydrogen sulfide and by converting it to sulfuric acid. Some species of Thiobacillus can thrive in acid solutions as concentrated as seven-percent and that's when the corrosion happens. Sulfuric acid attacks concrete, turning it into crumbly calcium sulfate, also known as gypsum. If conditions are perfect - for Thiobacillus - even thick concrete pipes can be compromised in just a few short months.

Conshield additive works by preventing the growth of Thiobacillus. It's a non-toxic, EPA-registered liquid product that's used like water when mixing concrete, forming a molecular bond with the cement matrix so it never leeches out. And Conshield fortified concrete is a hostile environment for Thiobacillus and other bacterium - they simply can't live in the presence of Conshield, so no sulfuric acid is ever created. No acid means no corrosion.

Woodstock Manholes

"Conshield was referred to us by the City of London, Ontario, so it was one of the alternatives we evaluated on a force main project," says David Evans, P.Eng., Branch Manager and Lead Designer at R.V. Anderson Associates Ltd., in London. R.V. Anderson designed a new force main system for Woodstock, Ontario. The force mains are serving two communities that are installing new gravity systems, and they're quite long - one is 13 kilometers and the other is 7 kilometers. "With that long a retention time, sewage becomes septic," Evans explains, "and in order to deal with the hydrogen sulfide (rotten egg odor), we needed substantial odor control facilities downstream of outlets. We knew there was a strong potential for MIC, so we started evaluating three solutions."

One solution considered the use of non-concrete pipe, such as high density polyethylene (HDPE). "But non-concrete alternatives are

expensive and require special installation practices," Evans explains. Another solution that was evaluated was the use of liners or coatings for pipe interiors, such as PVC or epoxy. "The problem with barriers," says Evans, "is that application methods basically have to be perfect, because even pinholes can be enough to allow corrosion. They have to hold up to any shifting or compression and that seemed like too much to ask."

That left Conshield, which was something of a dark horse candidate since there had been few applications in Canada. "It's a subtle approach," says Evans, "but we read the white papers and talked to cities in the USA that have been using it for some time. In fact, Conshield treated manholes are being installed in Woodstock as we speak."

After evaluation, R.V. Anderson concluded that Conshield is a cost-effective, long-term solution, and they are specifying it in more manholes as part of a comprehensive anti-corrosion program that also includes stainless steel internals and HDPE cover inserts. So far, the only problem encountered is identifying which manholes are treated! "They look like any other manhole," Evans explains, "so our supplier labels them so we can pick them out during installation."

City of London Experiments

The City of London approved Conshield for use in severe hydrogen sulfide environments. "We had been specifying commercial HDPE liners for London in situations where corrosion resistance was needed," explains Dillon Consulting Ltd. Project Engineer Paul Bruyns, P.Eng., "But one contractor asked us to look for other alternatives." It seems that the solution then being used was an HDPE liner cast into the manhole, which then required special welding and testing of joints after installation - the contractor pointed out that this was a tedious and time-consuming task, and raised questions of integrity since even a small sealant gap could allow bacteria to grow behind the liner. "And we realized it was a good idea to review other solutions," says Bruyns, "Since London has miles of relatively flat gradients and many sections have high levels of hydrogen sulfide gas."
Conshield was identified as a possible alternative, "We investigated it and then talked to users in the States (where Conshield has been in use since 1996, and has been approved by very large cities including Chicago, Atlanta, St. Louis and Miami), and what we heard sounded good. So we talked to the city about giving it a try," says Bruyns. London agreed, and Conshield was specified for a manhole replacement. "This was a badly corroded manhole in an area where we knew gas levels were high," says Bruyns, "It was about 35 years old and two inches of concrete had been wiped out by corrosion, exposing steel, which was also starting to corrode."

Hanson Pipe and Precast Ltd., in Cambridge, Ontario, cast the replacement manhole with Conshield. "We inspected the process, at the precast plant" says Bruyns. "It's a very straightforward product to use, and we didn't find any problems in the manufacturing." The new manhole was installed in 2007 and has been in service continually since then. In 2009, there was a meeting at the site that included representatives from the city, Dillon Consulting, Hanson Pipe, and Moosa Damerchie, B.Eng., the International Director of ConShield-Technologies Inc. "We were all very happy with the results," says Bruyns, "There was no observable degradation or corrosion at all."

Pleased with the results, London now regularly specifies Conshield for precast concrete in city sewer projects, and contractors are beginning to include it in official bids. "We are very satisfied with the performance of Conshield thus far," says Ashley M. Rammeloo, P.Eng., Sewer Operations Engineer for the city, "We will definitely consider it for use in future installations where hydrogen sulphide attack is a concern." With this kind of confidence in the solution, and since the early uses of Conshield in Canada have been successful, it's likely that man cities and agencies in Canada will follow London's lead.

FURTHER INFORMATION

ConShield
biotech armor for concrete
541 Tenth Street NW #233
Atlanta, 30318, USA
T +1 877 543 2094 · F +1 404 420 2160
info@conshield.com · www.conshield.com

Angus W. Stocking, L.S.
207A S. University Avenue
Beaver Dam WI 53916, USA
T +1 920 219 9544
angusstocking@gmail.com · www.infrastructurewriting.com