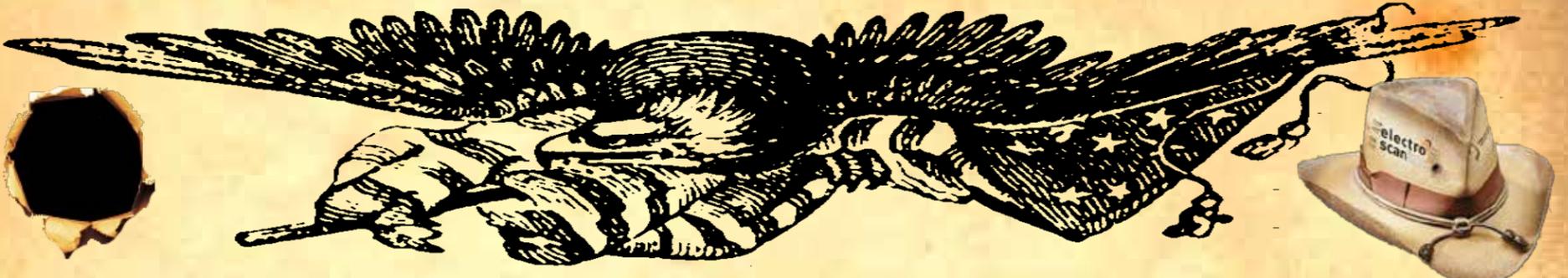


CRITICAL SEWER AND WATER CHRONICLES



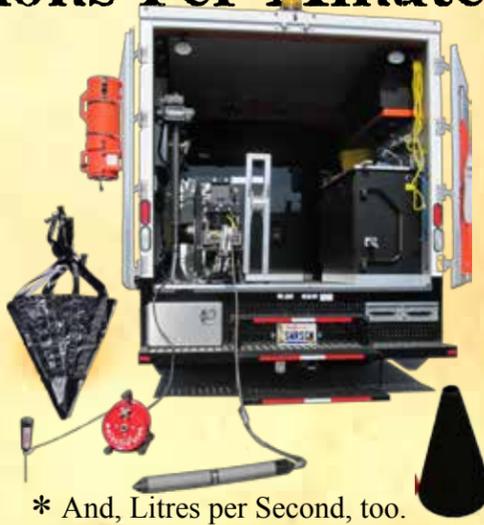
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ELECTRO SCAN TRANSFORMS PIPE ASSESSMENT MARKET

Electro Scan Finds Defects Not Found By CCTV; Estimates Defects in Gallons Per Minute*

Award Winning Technology Measures Effectiveness of Rehabilitation & Repairs

Recipient of many international awards, Electro Scan represents a breakthrough in locating and measuring the defect flow of pre- and post-rehabilitated pipes -- an industry first. Utilities can now measure the effectiveness of their repairs by using Electro Scan to calculate a *before* and *after* Defect Flow Rate. In contrast to closed-circuit television inspection (visual) and acoustic (audio) technologies, Electro Scan represents the next generation in condition assessment for water and wastewater infrastructure.



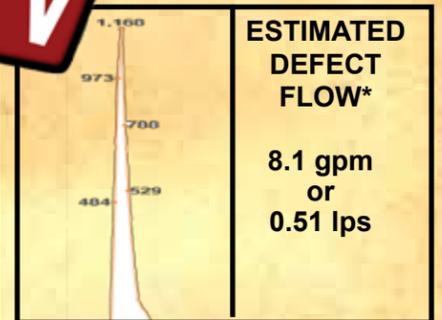
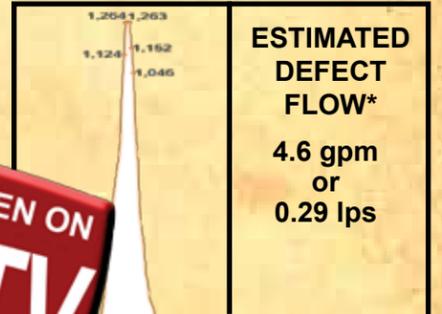
* And, Litres per Second, too.

CCTV | Kanalinspektion | 闭路电视

ELECTRO SCAN



NOT SEEN ON
CCTV



* Gallons per Minute (GPM) and Litres per Second (LPS) of Defect Flow assumes a 1ft (300mm) head and 1% pipe gradient with ±40% accuracy.

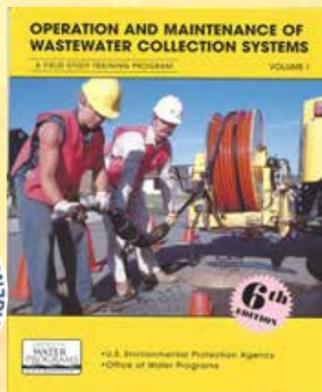
EPA ADDS ELECTRO SCAN TO CMOM COMPLIANCE

The EPA's Guide for Evaluating Capacity, Management, Operation, and Maintenance (CMOM) Programs at Sanitary Sewer Collection Systems has added Electro Scan.

Required for CMOM compliance, all sewer agencies can learn more about Electro Scan in the 7th Edition of Volume I, Operations and Maintenance of Wastewater Collection Systems.

New manuals can be ordered through:

Office of Water Programs
California State University
6000 J Street
Sacramento, CA 95819-6025
Tel: 916-278-6142
Website: www.owp.csus.edu



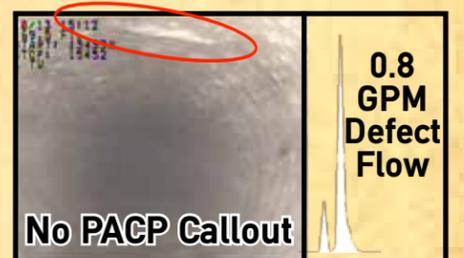
Page 5

Miami-Dade County CIPP Sewer Lining Bid Includes Electro Scan

Miami-Dade County Water and Sewer Department has issued an Addendum to lining contractors that specifies ASTM F2550 Low Voltage Test for Installed CIPP Liner.

The EPA has long acknowledged the shortcomings of CCTV to provide structural data on the integrity of pipes. Due to CCTV's reliance on visual interpretation, operator judgement, picture quality, and limitation to inspect surfaces above the waterline, sewer authorities have sought other technologies to more accurately locate and quantify pre- and post-CIPP defects.

In 2009, the EPA published *Condition Assessment of Wastewater Collection Systems* (EPA 600 R-09 049), where it first identified the electrical leak location method (first developed in 1981). Able to find defects in geomembrane liners, commercially available products were found to consistently determine the size of defects by measuring the amount of low voltage electrical current passing through the wall of a pipe.



As specified by ASTM F2550-13, low voltage testing for pre- and post-rehabilitated sewers can find numerous defects, not often found by CCTV or other legacy inspection methods, with the ability to estimate defect flow in GPM or LPS, with accuracy of ± 40 percent.

Miami-Dade County's addendum requires all installed cured-in-place pipe liners to be inspected with a low voltage system, as defined by ASTM F2550, to establish a baseline for warranty of the liner. All defects determined to compromise the CIPP liner's long term effectiveness would be repaired at the Contractor's expense.

Page 2

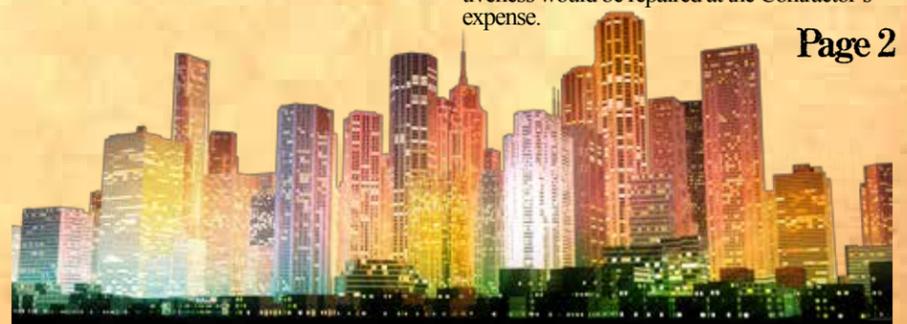


The New Economy Selects Electro Scan CleanTech of the Year

The editors of The New Economy magazine announced that U.S.-based Electro Scan Inc. was selected as its winner of the CleanTech 2013 Award for Best Water & Wastewater Solution and featured as its cover story for the April/May 2014 edition.

In its annual international competition, Electro Scan was chosen for its groundbreaking leak detection and cloud computing application that finds defects not previously found by traditional inspection technologies.

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Miami-Dade County's Lining Bid Specifies Low Voltage Testing to Find Defects in CIPP

Continued from Page 1

Key Field Operating Requirements

For each CIPP lined sewer, a low voltage test is mandated to begin with a light flushing of the sewer line. Flushed from the downstream manhole, the jet hose will be raised from the upstream manhole where the jet hose nozzle will be removed and replaced with a funnel cone. Once attached, the electro scan probe will be connected to the funnel cone.

Using the existing coaxial cable and reel included on CCTV trucks and vans, the Electro Scan probe is lowered into a manhole, similar to positioning a CCTV camera.

The hydraulically powered jet truck will pull the probe through the pipeline while simultaneously providing sufficient water necessary for the probe to electrically examine the integrity of the lined pipe and service reconstructions. Should a pipe segment be surcharged to the point where flushing is not appropriate, other techniques and equipment will be used, including (but not limited to): float lines, parachutes, plugs, or kites to help manage flow restrictions.

The scan represents a continuous survey, allowing the operator to avoid 'start' and 'stop' delays required to record individual defects. Instead, field crews can view a user-friendly operator's console, to monitor real-time readings such as speed, water pressure, and defect current levels, from a ground-level position.

All data is fed back to a laptop PC via a standard coaxial cable, generally used for legacy CCTV inspection. Once the data is collected on a laptop computer, it will be uploaded to a cloud-based portal where it will be instantly processed and available for owner/engineer/contractor and staff to view.

As one of the manufacturers of equipment compliant with ASTM F2550, Electro Scan Inc. looks forward to providing products and services to a growing number of sewer contractors being asked to provide pre- and post-CIPP defect assessments.

Required Survey Data

- Date of Inspection
- Location
- Pipe Size, Type, and Length
- Graph
 - ▶ Defect start / end and length (ft)
 - ▶ Possible GPM infiltration
 - ▶ Possible GPM Defect Area (ft.)
 - ▶ Defect Thresholds, including:
 - Small
 - Medium
 - Large
- Chart showing GPM, with
 - ▶ Minor flow and % of total flow
 - ▶ Moderate flow and % of total flow
 - ▶ Severe flow and % of total flow
 - ▶ Total GPM or LPS
 - ▶ Total GPD



Leading SF Bay Area Contractor Adds Electro Scan To Offer Pre- & Post-Rehabilitation Assessments

Founded in 1984, Subtronic Corporation is a leader in sub-surface utility engineering, providing utility location and mapping, ground penetrating radar, vacuum excavation, 3D concrete scanning, CCTV inspections, pipe cleaning, geophysical surveys, leak detection, and now, Electro Scan services. Headquartered in the San Francisco Bay Area, Subtronic has conducted projects worldwide.

Subtronic has been an Electro Scan customer since 2013 when it purchased an Electro Scan ES-620 which was retrofitted to its existing multi-conductor CCTV truck, able to be used in dual capacity.

Subtronic is certified to use Electro Scan for pre- and post-rehabilitation projects, including specialty assessment projects such as CIPP acceptance testing, siphons, flow monitoring calibration studies, and service lateral studies.

CUSTOMER PROFILE

Subtronic Corporation
 5031 Blum Road
 Martinez, California 94553
 Tel: 925-228-8771
 Website: www.subtronic.com

Contact:
 Jon Taylor, President
 Email: subtronic@subtronic.com



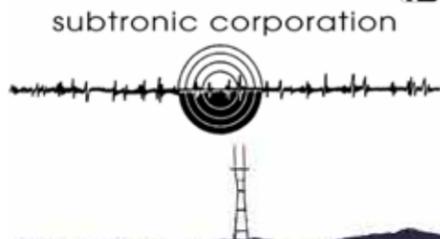
Sample Client Reports

| Date | From - To ID | Chiameter | Type | Small Defects | Medium Defects | Large Defects | Total GPM |
|--------------------|-----------------|-----------|------|---------------|----------------|---------------|--------------|
| 12/3/2014 | ED4007 - ED4008 | 12 | AC | 311 | 0 | 0 | 4.8 |
| | ED4004 - ED4006 | 12 | AC | 34 | 0 | 0 | 11.3 |
| | ED4006 - ED4001 | 12 | AC | 228 | 18 | 0 | 6.1 |
| | ED7006 - ED4009 | 19 | AC | 131 | 19 | 0 | 20.9 |
| | ED4011 - ED4008 | 12 | AC | 47 | 1 | 0 | 8.0 |
| | ED4008 - ED1022 | 12 | AC | 161 | 43 | 1 | 14.6 |
| | ED1022 - ED1021 | 19 | AC | 217 | 1 | 16 | 12.2 |
| | ED1021 - ED1020 | 12 | AC | 122 | 0 | 0 | 28.2 |
| | ED1020 - ED1018 | 12 | AC | 181 | 1 | 0 | 30.4 |
| 12/3/2014 | ED4009 - ED4040 | 19 | AC | 118 | 11 | 0 | 18.9 |
| | ED4040 - ED4037 | 19 | AC | 33 | 0 | 0 | 4.8 |
| 1/11/2014 | ED2071 - ED4008 | 8 | VG | 124 | 11 | 0 | 12.8 |
| Grand Total | | | | 1,883 | 162 | 16 | 273.4 |

| Defect Count | % of Defect Lengths | GPM Summary |
|--------------|--|--|
| S 43 | Small Defects % of Scan Length 3.440% | Minor GPM Flow 14.57 |
| M 7 | Medium Defects % of Scan Length 2.340% | Moderate GPM Flow 16.05 |
| L 3 | Large Defects % of Scan Length 1.110% | Severe GPM Flow 18.14 |
| | All Defects % of Scan Length 6.880% | Total Gpm Flow 48.76 |
| | | Approx Flow All Defects Per Day 70.214 |
| | | Minor % of Total Flow 29.88% |
| | | Moderate % of Total Flow 32.92% |
| | | Severe % of Total Flow 37.20% |

Scan Graph

Source: Critical Sewers® Cloud Application, Electro Scan Inc., 2014



Compliance EnviroSystems Completes 67,000 LF Nashville Project in 30 Days

Nashville Metro Water Services selected Compliance EnviroSystems, LLC (CES) in March 2014 to complete a 57,000 linear ft (17km) Electro Scan project, which was extended an additional 10,000 LF. Completed in May 2014, the project evaluated two basins that had been previously smoke tested, with a high number of plastic pipes.

Metro Water Services is a department of the Metropolitan Government of Nashville and Davidson County and is Tennessee's largest provider of wastewater collection and treatment. Metro Water Services provides service to more than 176,000 water accounts and more than 189,000 sewer accounts, managing over 2,800 miles of sewer.

During the project, CES set a number of Electro Scan contractor milestones, including:

- **Most Footage Scanned in a Single Day**
3,751.5 LF
- **Most Segments Scanned in a Single Day**
21
- **Most LF Scanned in 30 Work Days**
67,038.1 LF

All reports were provided to the consulting engineer, including detailed reporting of each scan with all Critical Sewers® ranked by defect flow ratings, in gallons per minute.

About CES

Founded in 1995, CES is a full service storm sewer and sanitary sewer evaluation firm, headquartered in Baton Rouge, Louisiana, with offices throughout the Southeast and Eastern U.S. Known for its commitment to deliver quality sewer inspection data and pioneering use of new technologies, CES was instrumental in the clean-up work after hurricanes Katrina and Rita in 2005 and the 2010 floods in Nashville.

CES has been an Electro Scan customer since 2013 when it purchased an Electro Scan ES-620 which was retrofitted to one of their multi-con-

ductor CCTV trucks. CES is certified to use Electro Scan for SSES projects, pre- and post-CIPP assessment projects, and specialty assessments, including siphons, flow monitoring calibration studies, and service lateral studies.

Casey Smith
Compliance EnviroSystems, LLC
1401 Seaboard Ave.
Baton Rouge, LA 70810
Tel: 225-769-2933 or 800-675-9409
Email: csmith@ces-ses.com



Wessex Water Completes Major Trial; Files for International Awards

Wessex Water in partnership with Electro Scan, surveyed 1.5km of 150mm/225mm sewers known to be subject to considerable infiltration in the villages of Newton Tony, Combe Florey and Cerne Abbas, England, in February 2013.

The sewers in Newton Tony were surcharged after considerable rainfall. Since Electro Scan must be performed with its probe submerged underwater, there were no delays, whereas the CCTV verification had to be performed later.

The trials at Combe Florey included undertaking a full survey with Electro Scan, twice on consecutive days. This allowed Wessex Water to compare results by over lay, which showed the system to be accurate and repeatable. Slight variations occurred due to difference in speed of transducer transient pull through and slight reduction in the external water pressures and flows.

At the time of writing, Wessex Water RT was establishing a process of drilling standpipes into the ground to data log water tables correlated to flow monitors and rain gauges to match against the Electro Scan outputs of groundwater infiltration. From this information existing algorithms can be refined.

The Electro Scan process was successful when used on the section S105A sewers in the village of Mark, Somerset, in late 2013, where flows are transferred to a vacuum sewerage system, which had reduced serviceability due to ground water inundation. Some 43 sewer mains were identified as the most critical assets with a cumulative infiltration of 12 l/s,

under a head of some 600mm of ground water over pipe soffits, giving over 1000 m³ of infiltration a day. The Opex cost of dealing with this groundwater was estimated at £120,000 per annum.

Capital schemes to prevent the infiltration were designed, included epoxy lining, which has been successful; also, post Electro Scan surveys of the cured-in-place-pipe linings confirmed they were effective.

But lining is not the only answer. In the process of utilising Electro Scan, Wessex Water also developed a method to seal a difficult knuckle bend under Cerne Abbas High Street, temporarily sealing the sewer with a heavy-duty calibration hose under pressure, whilst rake drilling across the road to inject a foaming hydrophobic structural polyurethane to seal the bend from the outside. This prevented a £2,000 road closure for the day, and was economic, sustainable, and customer-friendly.



Julian Britton, Critical Sewers Manager, Wessex Water, England

Severn Trent Services Publishes Innovative Bulletin on Electro Scan

Innovation Bulletin



18th February 2014
Ref: ABC 0000
(for completion by Standards Team)



Electro Scan

The Next Generation in Sewer Leak Detection | Finding Infiltration Missed by CCTV

Brief description

Electro Scan is a revolutionary technology that locates defects having the potential for causing infiltration into sewers and other pipes. Not dependant upon any visual identification of infiltration at the time of the survey, the solution provides an estimated liters per second (l/s) for each defect. Most sewer pipe materials such as clay, plastic, concrete, reinforced concrete, resin linings, and brick are poor conductors of electrical current. As a result, if a defect exists in the wall of a pipe, then the leakage of electrical current will indicate the source of a potential water leak, whether or not water infiltration or exfiltration actually occurs at the time of the Electro Scan.

Details

Electro-scanning is carried out by applying an electrical potential (voltage) between an electrode (probe) in an electrically nonconductive pipe and an grounding stake on the surface. The water in the pipe is at a level that ensures that the pipe is full at the probe location, during the survey. The probe is pulled through the pipe at a speed of 10 m/minute and the variation of electric current flowing between the probe and the fixed electrode on the surface is measured. When the probe is close to a pipe defect the electric current increases because the defect decreases the electrical resistance of the pipe wall. All data is automatically collected and sent to a web-based cloud platform for instant processing and display.

Benefits

- The Electro Scan technology is able to:
 - Automatically locates sources of infiltration, whether visible or not, in pipes 75mm to 600mm
 - Measure and quantify each defect found (estimated LPS of infiltration), no matter the weather conditions
 - Provide repeatable, objective data
 - Performed without specialized certification
 - Help prioritize rehabilitation programs
 - Certify relined pipes and repairs as "leak-free"
 - Evaluate surcharged pipes (including siphons) without the need to bypass or empty
 - Maintain an almost-zero survey abandonment rate
 - Perform scans in pipes filled with fats, oils, and grease (FOG)
 - Immediately processes data and presents it in a cloud-based application

Electric Circuitry of a Sewer Main



For further information contact:
sean@anthire.com
or
info@electroscan.com

Miami-Dade Water and Sewer Department Upgrades CCTV Truck to Include Electro Scan

South Florida, in particular, the City of Miami and Miami-Dade Water & Sewer Department (WASD), have not had it easy in recent years. Sitting above a vast and porous limestone plateau - imagine Swiss cheese and you'll have a good idea of what it looks like underground - infiltration has been a daunting challenge.

According to Glenn Landers, Senior Engineer, U.S. Army Corps of Engineers, underground water moves around easily and freely, seeping into yards at high tide, bubbling up on golf courses, flowing through underground caverns, and corroding building foundations. Not to mention flooding sewers mains through cracks, broken joints, and defective service connections.

"Conventional sea walls and barriers are not effective," says Robert Daoust, an Ecologist at ARCADIS, a Dutch firm that specializes in engineering solutions to mitigate rising seas. "Protecting the city, if even possible, will require innovative solutions."

Miami has found one such innovative method, at least to find their worst defects, in Electro Scan. First meeting at the ASCE



Macy Grubbs, Electro Scan, Rod Lovett, Chief of Wastewater Collection at Miami-Dade WASD, and Ralph Terrero, Assistant Director, Miami-Dade County Water and Sewer Department.



conference in August 2012, Electro Scan demonstrated their ES-620 system for Miami in February 2013, surveying both lined and pre-lined VCP pipe. Follow-up meetings were held in March & August 2013. Impressed by the data, Electro Scan worked through their newest dealer, Larry Ruffin - owner of RUTT, Inc., to allow Miami to begin the procurement process for a new ES-620 system beginning in September 2013.

Working closely with Rod Lovett, Chief of Wastewater Collection at Miami-Dade WASD, the relationship between Electro Scan and Miami has grown since that first meeting over two years ago.

Lovett's initial interest in Electro Scan stemmed from his desire to examine sewer

pipes within the cone of influence of WASD's groundwater wells to determine locations where sewage exfiltration and rain-dependent infiltration (RDI) could impact water sources.

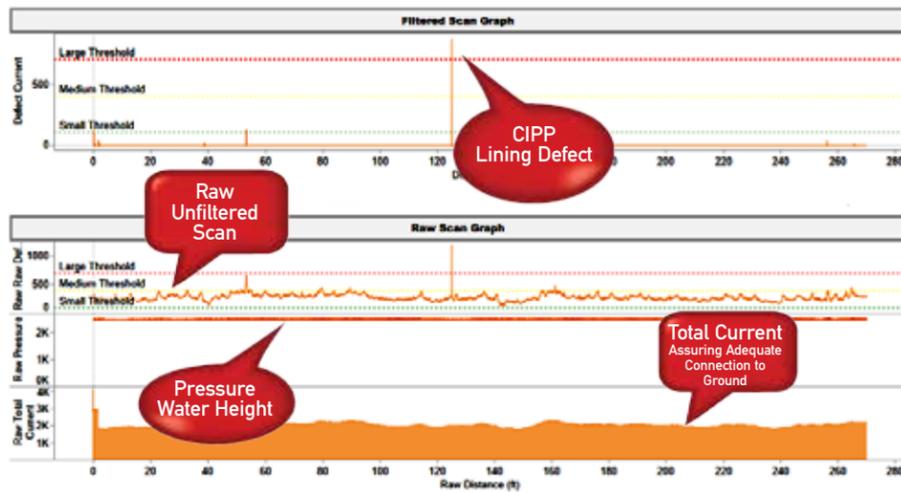
In the year since the purchasing cycle began, Lovett's priorities have shifted. Miami, now operating under a recently-issued EPA Consent Decree, realized that with the change to Electro Scan's ASTM Standard, their soon-to-be-purchased ES-620 system would be in high demand within the county for locating issues and evaluating pre- and post-rehabilitation projects.

Electro Scan completed a second demo in July 2014 when five 8" & 10" VCP sewer mains were scanned, with 4 out of the 5 pipes lined using a CIPP method. Miami's purchase

of its ES-620 was approved in late July, with a Purchase Order issued in early August.

Requesting an expedited delivery and training schedule, Electro Scan completed its ES-620 installation and integration in one of WASD's existing Cues CCTV rigs during the week of August 25th, including the training & field certification of six WASD staff members.

Electro Scan looks forward to supporting its new friends and important customers in Miami. To quote Albert Einstein, "We can't solve today's problems with the same things that it took to create them." Electro Scan is proud to be an innovative technology partner with Miami-Dade County WASD.



Miami-Dade County Water & Sewer Infrastructure Profile

| | |
|---------------------------|---------|
| Gravity Sewers (Miles) | 3,071 |
| Force Main (Miles) | 910 |
| Public Laterals (Miles) | 2,241 |
| Miles of Water Main | 5,983 |
| Regional WWTPs | 3 |
| Pumping Stations | 1,035 |
| Wastewater Capacity (MGD) | 376 |
| Water Usage (MGD) | 313 |
| Sewer Customers | 338,368 |
| Water Customers | 420,367 |
| Employees - Sewer | 1,269 |
| Employees - Water | 1,102 |
| Elevation (Feet) | 12 |

Source: US EPA Consent Decree (2013) and CAFR (2012)

Ex-Crimson Tide, Larry Ruffin & RUTT, Inc. Become Exclusive Electro Scan Dealer in Alabama & Florida

RUTT to Offer Electro Scan Contract Services, Post-Rehab Certification, and Pilot Projects



Once a member of Coach Bear Bryant's Crimson Tide and now a member of Electro Scan's team? Electro Scan is delighted to announce that RUTT, Inc., a portfolio company of Ruffin Investments, Inc., has been appointed the exclusive dealer for Electro Scan products in the states of Alabama and Florida.

Specializing in water resource technology-based materials and services, RUTT, Inc., represents the who's who of manufacturers and suppliers to the water & wastewater business. "We make a concerted effort to find and negotiate dealer agreements with vendors we think are leaders in their markets," states Larry Ruffin, President of RUTT. "Our customers were the first to tell us about Electro Scan, which is always the best start to any discussion. Add to that the product's advantages and a great team of people that support the technology & training, and you have a winning combination."

About Larry Ruffin

Larry Ruffin has been serving the water industry for over 20 years, but Larry Ruffin's winning attitude and teamwork began early, especially gaining momentum during his college years at the University of Alabama, where he played for famed-coach Paul W. 'Bear' Bryant on his NCAA championship football team.

Playing offensive guard on the 1973 Crimson Tide and undefeated in the SEC Conference (8-0), Larry Ruffin has been a long-time football enthusiast, bringing the same winning approach in most everything he does.

"That Thanksgiving win of 21-7 over LSU is a big reason we (probably) will not let Larry [Ruffin] represent us in Louisiana," jokes Chuck Hansen, CEO of Electro Scan.

RUTT to Offer Electro Scan Service

In addition to handling the sale of Electro Scan products in Alabama & Florida, RUTT, Inc. has joined an elite group of dealers that also offer Electro Scan services.

Purchasing a new CCTV truck from local manufacturer, CUES, Inc., RUTT has been trained and certified to offer Electro Scan services and data reporting in accordance with ASTM F2550-13.

"While TV inspection can be done when the pipe is relatively dry or at a low water level, right away we saw that Electro Scan was the first product that could evaluate a pipe in wet weather conditions, when most I&I occurs," stated Larry Ruffin.

With sales reps throughout Alabama and Florida, RUTT was already responsible for negotiating the sale and support for Electro Scan products and services at Miami-Dade Water and Sewer Department.



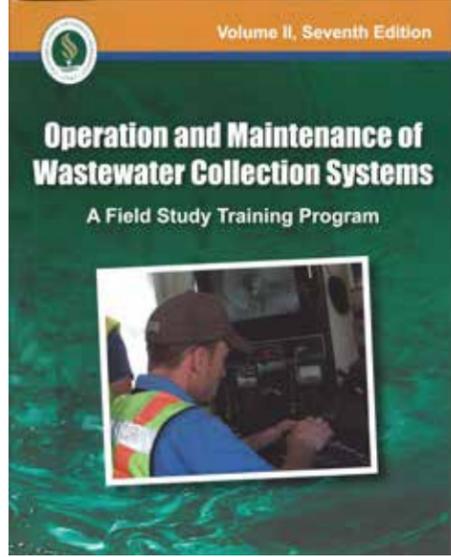
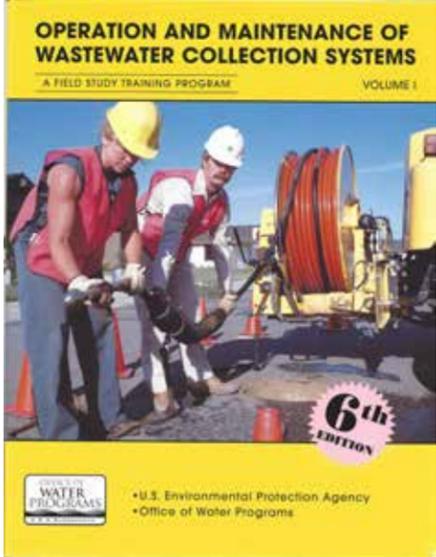
Larry Ruffin

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Electro Scan Added to 7th Edition of Industry Leading Operation & Maintenance Manual

EPA CMOM Requirements Expand To Include Electro Scan Technology



As the wastewater collection industry continues to undergo change, end-users, subject matter experts, and editors of the OPERATION AND MAINTENANCE OF WASTEWATER COLLECTION SYSTEMS, Volume I and II, maintain a constant search for better ways of getting things done.

As municipal budgets get tighter, knowledgeable operators retire, and vacancies go unfilled, the need to adopt more efficient and effective 'best practices' has never been greater.

Some industry changes represent incremental product innovations, e.g. small-scale improvements, existing product extensions or refinements that tend to have a certain ritual, rhyme, rhythm, or reason. Higher resolution CCTV cameras, improved flow monitoring algorithms, and enhanced user controls for jet trucks, represent important, but incremental product enhancements. Often quite predictable, long-time established companies

often introduce these improvements at regular intervals that are tested, reviewed, and substituted for older, legacy models.

In contrast, start-up companies, pursue *innovation* as their whole business. Developing products outside of large company bureaucracies often create breakthrough products that utilize new technologies and disrupt longstanding products. The use of distributed optical fiber sensors, pressurized flood grouting, adhesion-based epoxy liners, and acoustic sensors are all examples of emerging technologies from nimble new entrants.

Case Study: Electro Scan

Development of a new condition assessment method, known as Electro Scan, scheduled for publication as part of the upcoming 7th Edition of the OPERATION AND MAINTENANCE OF WASTEWATER COLLECTION SYSTEMS, Volume I, began its journey in the 1990s.

Originally introduced in 1995 and later abandoned after commercial prototypes were unable to deliver consistent results, software and hardware intellectual property was acquired in 2011 by software entrepreneur, Chuck Hansen, former owner of Hansen Information Technologies.

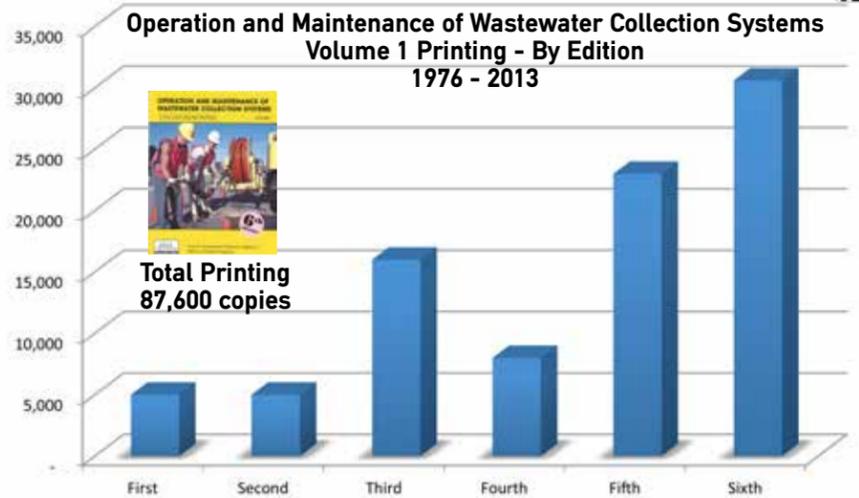
Soon after, the product was re-engineered to become an add-on accessory to traditional CCTV trucks, utilizing existing cable, reel and power systems.

In November 2013, Ken Kerri invited representatives of Electro Scan to contribute a new chapter to the up-

coming Seventh Edition of Volume 1. Meetings were scheduled in late 2013 and 2014 to outline general requirements, content, and writing style that would guide chapter development.

Beginning with the exchange of multiple text-based draft documents, more advanced versions included diagrams, site photographs, and tables, leading to a pre-press chapter ready for review by other editors.

The Electro Scan team is honored to be a part of this leading textbook used throughout the industry.



CHAPTER 5. INSPECTING AND TESTING COLLECTION SYSTEMS

5.6 ELECTRO SCAN

Electro Scan technology uses an electrically-charged probe to automatically find and measure pathways where water may pass through the walls of non-conductive pipes. This innovative technology is based on the laws of geophysics that directly correlate the leakage of electrical current with the flow of water, and provides a consistent and sustainable technique to locate and measure specific defects that have the potential for water leakage.

Electro Scan is governed by ASTM F2550-13, *Standard Practice for Locating Leaks in Sewer Pipes By Measuring the Variation of Electric Current Flow Through the Pipe Wall*. Unlike CCTV inspection, smoke testing, dye flood testing, ground penetrating radar, and laser profiling technologies, no third-party interpretation or defect cataloging is required. In addition, no visual observations, manual coding, or interpretation of data by the operator is required.

Figure 1 - Electric current reading variations displayed with an Electrical Trace

Electro Scan represents the first automatic, unambiguous assessment tool that locates and measures pipe defects that leak. Each defect found is given an estimate (in gallons per minute, or GPM) of the potential amount of water that may flow through the defect. By providing an objective numeric value for each defect, Electro Scan takes the guess work out of quantifying pipe defects.

5.6.0 Use of Electro Scan

Many traditional condition assessment techniques are conducted during periods of dry weather conditions, despite an ongoing need to understand how sewer and storm water pipes perform in wet weather conditions. Electro scan can be used year round and can detect defects often missed by visual inspection such as bad joints, defective service connections, and both radial and longitudinal cracks.

Electro Scan is designed to find and measure defects in non-conductive pipes, including asbestos cement, brick, clay, cured-in place pipe (CIPP), fiberglass reinforced pipe (FRP), high-density polyethylene (HDPE), plastic (PVC) and reinforced concrete pipe (RCP).

While early prototypes of Electro Scan technology utilized a standalone cable and reel design, later models use an adaptive approach (Figure 1) that utilizes existing CCTV cable and reel configurations available from major manufacturers. This provides a straightforward, familiar infrastructure that can easily change during operations from CCTV to Electro Scan, and back again, in generally less than ten minutes.

During scanning, the area around the probe is surrounded by water. While being pulled at a rate of 45-60 feet per minute, the probe emits a low-voltage, high-frequency electric current of approximately 10 volts and 40 milliamps—roughly equivalent to six AA batteries (Figure 2).

Defects in the pipe wall are found by measuring variations in electric current received from the probe. The displayed trace of this current variation is similar in looks to an electrocardiogram (EKG) that measures the rhythm of each heart beat (Figure 3).

A sharp rise in the electric current reading indicates a defect in the pipe. A solid pipe wall will resist electricity, but a defect in the wall will allow electricity to easily pass through. Reported defect location is accurate to within 0.4 inches (1 centimeter). Start and end dimensions of any defect are provided, and a defect flow rate is estimated in gallons per minute (GPM), or liters per second (LPS). GPM accuracy is ±40%, confirmed by flow meter testing and open trench smoke testing in accordance with ASTM F2550-13.

Data Consistency

A key advantage of Electro Scan over alternative assessment techniques is its ability to repeat data inspection results on a consistent and sustainable basis regardless of the equipment operator. As shown in numerous EPA-funded studies and benchmarks, data patterns remain similar after short-term periods of repeat scans (Figure 4).

Data Intensity

Electro Scan records data every quarter inch, or every 14 milliseconds. Thus, for an average 300-ft pipe segment, Electro Scan will generate 10,000 to 20,000 data points depending on the rate of speed that the probe is pulled through the pipe. Each data point is transmitted to an on-board computer located in the operator's truck.

Figure 2 - Electro Scan System

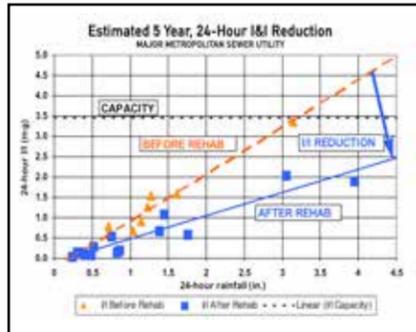
The Electro Scan system's adaptive design allows for quick, simple transitions between CCTV and Electro Scan configurations. The Electro Scan probe connects to the reel with the same type of plug the CCTV camera uses. A switchover box allows for data switching to either the CCTV Terminal or the Electro Scan Controller, and then to the Computer for viewing and storage.

Figure 3 - Assessing Sewer Pipe with Electricity

The Electro Scan Probe emits a narrow, focused beam of low-voltage high frequency electricity as it is pulled through the sewer pipe. The nonconductive walls of the pipe resist this electricity. However, if a defect with leak potential is encountered in the pipe, the electricity escapes and is received by the nearby ground stake. This variation in electric current is measured and used to locate and measure all potential leaks within the pipe.

Leading Engineers Specify Electro Scan to Measure Pre- and Post-Rehabilitation & Repair Effectiveness

As a general rule, sewer owners and operators have widely believed that for every 1,000 linear feet (LF) or 305 meters (m) of lining or pipe replacement, approximately 8-10 million gallons per year (2.9 to 3.7 billion liters



per year) of infiltration could be eliminated. To combat infiltration, municipal bonds are sold to raise funds, expenditures are budgeted, specifications are published to solicit tenders, and contractors are selected to deploy various trenchless technologies, including: lining, coating, and curing methods.

Trenchless rehabilitation has been a long-standing response to reduce inflow & infiltration; however, an increasing number of utilities are either finding limited reductions in flow or returning to pre-rehabilitation levels of infiltration.

Impaired CIPP Projects Are Growing

Recent studies have been limited to evaluating field samples of lining cross-sections to assess whether the originally planned lifetime of CIPP (typically assumed to be 50 years) was achievable. Yet, post-rehabilitation inspections are starting to uncover serious impairments that question widely held assumptions on the operating performance and overall effectiveness of CIPP, especially when not properly installed or inspected.

While post-rehabilitation inspection of CIPP has been limited

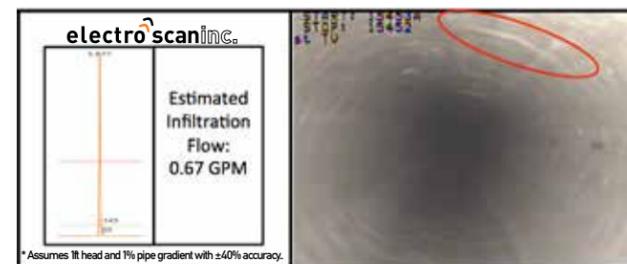
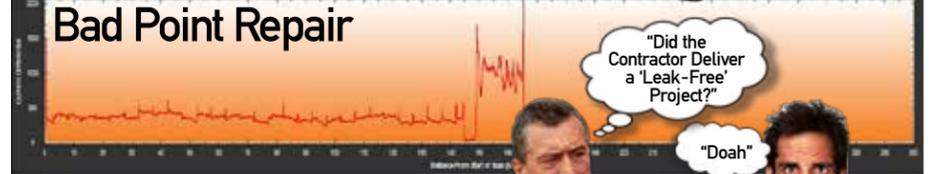
to CCTV inspection or pressure testing of pre- and post-inverted liners, a new technology known as Electro Scan (ASTM F2550-13) has emerged to offer an unbiased, quantitative assessment of pre- and post-rehabilitated pipes that can provide a before and after defect rating of critical sewer and water assets.

The advantages of providing pre- and post-rehabilitation defect flows, expressed in either gallons per minute (GPM) or litres per second (LPS), are numerous. Key benefits of a quantitative analysis of defect flows, before and after rehabilitation, include the ability to:

- Establish a baseline defect flow rating to prioritize critical sewers & water assets;
- Overcome shortcomings of visual observations and cataloguing using CCTV cameras;
- Quantify specific reductions in infiltration from rehabilitation, repairs, and renewal;
- Enforce minimum allowances for defect flows as part of manufacturer's warranties;
- Certify post-rehabilitated repairs, relining, and renewal of pipes.

Recent Electro Scan surveys are uncovering a number of defects in CIPP, not found by post-CCTV investigation. In addition to evaluating CIPP linings (directly after their installation), evaluation of CIPP linings installed 5-15 years ago are showing evidence of root intrusions, cracks, and defective service re-connections, similar to unlined pipes.

As part of a recent report published by the US EPA, testing of CIPP was conducted in both large and small diameter sewers in two cities: Denver, Colorado and Columbus, Ohio. Other cities have subsequently been added to this ongoing study.



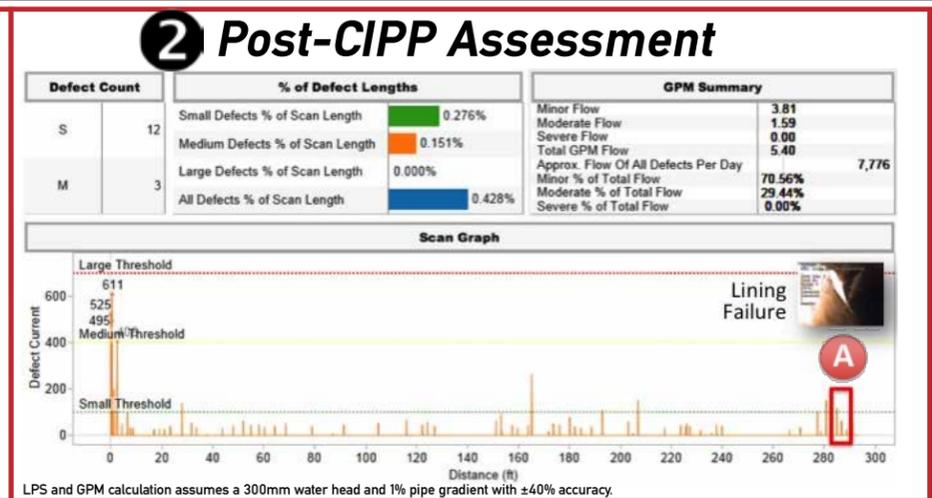
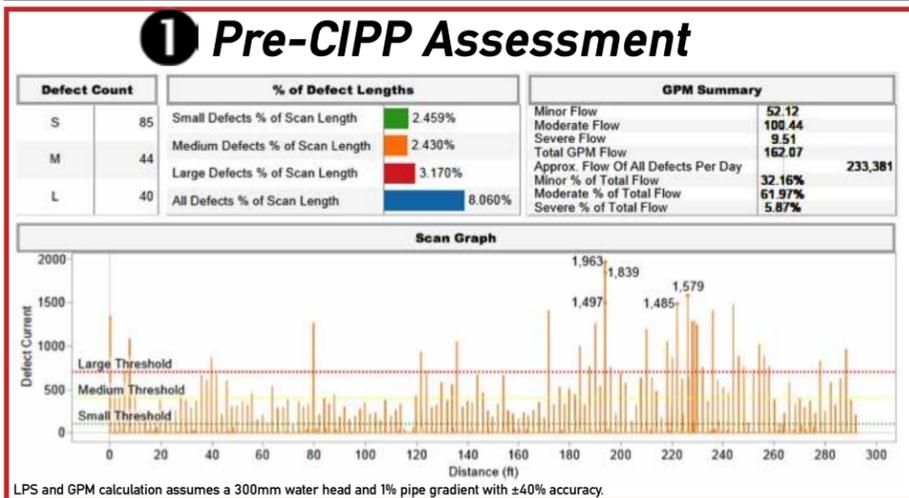
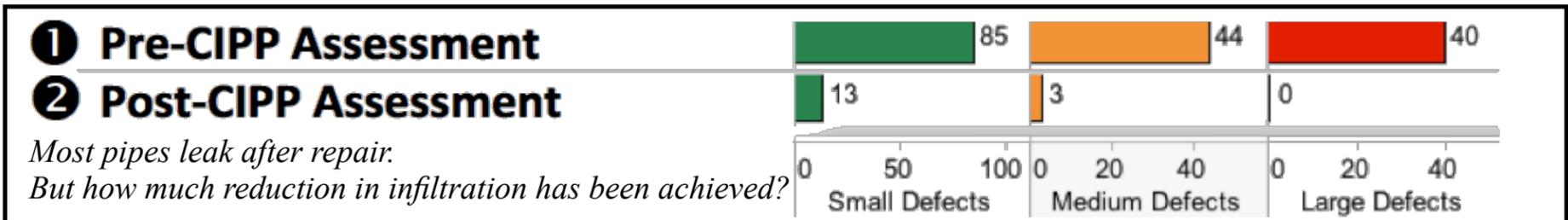
COMMON CIPP LINING DEFECTS
Tears, Rips, Ribs, Cracks, Over-Heating, Defective Service Reconnections, Lifts, Buckling, Ruptures, Fins, Wrinkles, and Pinholes
Often Missed by CCTV, but Identified and Measured by Electro Scan (F2550-13).

The purpose of the EPA study was to determine whether the originally planned lifetime of CIPP was reasonable based on the current condition of the liner. Despite the large public investment in CIPP, prior to this study there had been little quantitative analysis to confirm if structural or operating performance was as expected.

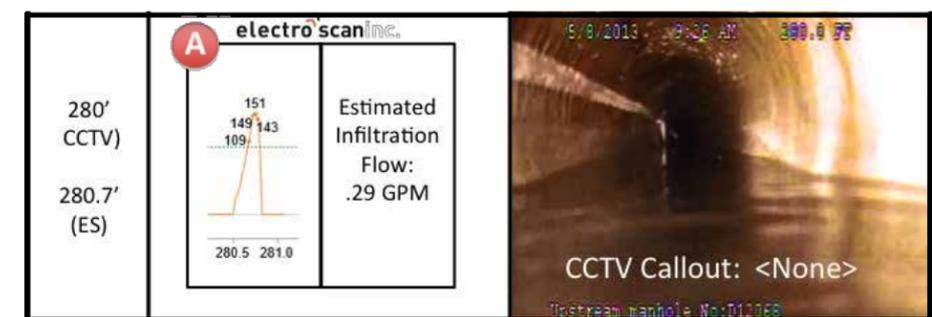
While the study concluded that there was no reason to anticipate that liners would not last for their intended lifetime of 50 years (and perhaps beyond),

the study failed to address or quantify the severe degradation in operating performance of the post-rehabilitation pipe where numerous break-ins, root intrusion, and failures were found.

While liner cross-sections should continue to be laboratory-certified, long-term operating performance of CIPP may not be assured if proper installation and/or inspection protocols are not used. As a result, it is recommended that Electro Scan testing be conducted on older lined pipes to determine if CIPP life expectancy can be achieved.



| Pre- and Post-Rehabilitation | Gallons Per Minute | Gallons Per Day | Number of Defects | | | |
|------------------------------|--------------------|-----------------|-------------------|------|-------|-------|
| | | | S | M | L | TOTAL |
| 1 Pre-CIPP | 162.07 | 233,381 | 85 | 40 | 40 | 165 |
| 2 Post-CIPP | 5.40 | 7,776 | 13 | 3 | 0 | 16 |
| REDUCTION | -156.67 | -225,605 | -72 | -37 | -40 | -149 |
| REDUCTION (%) | -97% | -97% | -85% | -92% | -100% | -90% |



Electro Scan finds defects in bad CIPP lining projects missed by CCTV Inspection.

Concern Grows Over CIPP's Useful Life, Without Proper Installation & Inspection Standards

Electro Scan Shows Defects in CIPP Lined Pipe

40% of 14-Year Old CIPP Lined Pipes Measure 10,000 GPD Defect Flow or More

In 2014, a major metropolitan sewer utility conducted an Electro Scan survey of forty-nine (49) previously lined cured-in-place pipe (CIPP) segments, installed in early 2000, i.e. less than 14-years old.

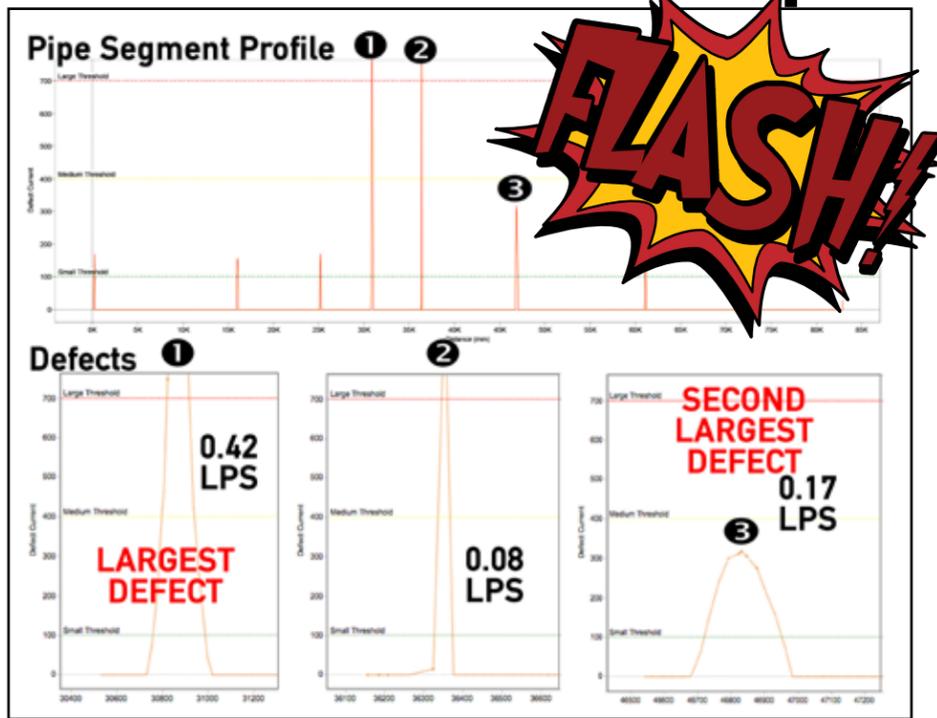
Representing the first major post-CIPP evaluation conducted using the Electro Scan technology in accordance with ASTM F2550-13, the study area had previously undergone a comprehensive smoke testing survey, noting only a few minor defects, with CCTV proving unreliable in locating sources of rainfall-dependent infiltration (RDI).

While Electro Scan had previously surveyed over one hundred (100) CIPP lined pipes, point repairs, and other pipe renewal methods, at other cities, no prior study had been undertaken to determine a specific estimated leakage rate expressed in gallons per minute (GPM) of defect flow for a single sewer authority.

Study results showed that all 49 CIPP segments had quantifiable defect flows, with forty percent (40%) of the pipes registering 10,000 GPD or more of defect flow.

Electro Scan has emerged as the industry's first automated assessment tool, not requiring manual coding or visual observations. Using a low voltage/high frequency international patent-pending technology, Electro Scan can find and measure defect flows likely to result from cracks, fractures, open joints, defective service connections, and poorly installed lining projects.

Representing 8,719 linear feet of CIPP lined pipe, the study accumulated 196,187 raw data points and 121,527 filtered data points, finding 215 Total Defects and 479,822 Gallons per Day of estimated defect flow, with highlights provided below.



CIPP Pipe Segment #6.

As shown above, pipe segment showed seven (7) defects, representing 2 Large and 5 Small Defects, with three of the worst defects highlighted. As described in the 2013 WERF/EPA Milwaukee Metro Electro Scan Revisited Study, an advantage is to not only measure the Height of each defect, but the Width (including Start and End Points). It should be noted that while the highest defect currents are noted in Defects 1 and 2, Defect 3 actually contributes the second highest defect flow as shown by its larger calculated area.

| Electro Scan ID | Distance | | Raw Data Points | Filtered Data Points | Number of Defects | | | | Defect Flow (GPM) | | | | Estimated Defect Flow (Gallons Per Day) | Estimated Defect Flow (Litres Per Second) | |
|-----------------|-----------------------------|-----------|-----------------|----------------------|-------------------|-----|-------|-------|-------------------|-------|--------|--------|---|---|------|
| | mm | ft | | | Small | Med | Large | TOTAL | Small | Mod | Severe | Total | | | |
| | 2,657,420 | 8,719 | 196,187 | 121,527 | 157 | 34 | 25 | 216 | 57 | 76 | 200 | 333 | 479,822 | 21.0 | |
| 1 | 00000179_apr012014_144919PM | 73,685 | 241.7 | 5648 | 4158 | 25 | 1 | 3 | 29 | 8.59 | 3.84 | 30.00 | 42.43 | 61,099 | 2.7 |
| 2 | 00000175_apr012014_111742AM | 91,435 | 300.0 | 4701 | 3725 | 1 | 0 | 2 | 3 | 0.85 | - | 19.74 | 20.59 | 29,650 | 1.3 |
| 3 | 00000186_apr022014_092453AM | 22,244 | 73.0 | 1573 | 763 | 2 | 0 | 2 | 4 | 0.34 | - | 17.62 | 17.96 | 25,862 | 1.1 |
| 4 | 00000178_apr012014_140110PM | 96,692 | 317.2 | 4988 | 4211 | 1 | 5 | 0 | 6 | 0.76 | 14.99 | - | 15.75 | 22,680 | 1.0 |
| 5 | 00000102_mar262014_154308PM | 75,310 | 247.1 | 4704 | 2724 | 1 | 2 | 1 | 4 | 0.19 | 4.98 | 10.00 | 15.17 | 21,845 | 1.0 |
| 6 | 00000180_apr012014_145714PM | 82,865 | 271.9 | 4451 | 3576 | 5 | 0 | 2 | 7 | 2.61 | 3.97 | 6.66 | 13.24 | 19,066 | 0.8 |
| 7 | 00000191_apr022014_113856AM | 94,769 | 310.9 | 4696 | 3619 | 0 | 1 | 1 | 2 | - | 2.48 | 10.00 | 12.48 | 17,971 | 0.8 |
| 8 | 00000176_apr012014_120759PM | 92,114 | 302.2 | 5410 | 4454 | 1 | 1 | 1 | 3 | 0.99 | 1.22 | 10.00 | 12.21 | 17,582 | 0.8 |
| 9 | 00000344_apr222014_111205AM | 38,109 | 125.0 | 3890 | 2168 | 4 | 0 | 1 | 5 | 1.35 | - | 10.00 | 11.35 | 16,344 | 0.7 |
| 10 | 00000171_apr012014_084724AM | 68,832 | 225.8 | 5116 | 3767 | 3 | 0 | 1 | 4 | 1.38 | - | 9.50 | 10.88 | 15,667 | 0.7 |
| 11 | 00000237_apr112014_090747AM | 62,299 | 204.4 | 5051 | 2803 | 1 | 0 | 1 | 2 | 0.67 | - | 10.00 | 10.67 | 15,365 | 0.7 |
| 12 | 00000347_apr222014_132003PM | 14,011 | 46.0 | 3877 | 888 | 3 | 2 | 1 | 6 | 1.12 | 3.20 | 6.27 | 10.59 | 15,250 | 0.7 |
| 13 | 00000169_mar312014_162416PM | 57,561 | 188.8 | 3079 | 2078 | 1 | 0 | 1 | 2 | 0.16 | - | 10.00 | 10.16 | 14,630 | 0.6 |
| 14 | 00000168_mar312014_161732PM | 32,279 | 105.9 | 1759 | 1242 | 0 | 0 | 1 | 1 | - | - | 10.00 | 10.00 | 14,400 | 0.6 |
| 15 | 00000353_apr222014_152723PM | 49,228 | 161.5 | 4859 | 2309 | 1 | 0 | 1 | 2 | 0.85 | - | 8.52 | 9.37 | 13,493 | 0.6 |
| 16 | 00000181_apr012014_152848PM | 86,032 | 282.3 | 4722 | 3808 | 1 | 1 | 1 | 3 | 0.42 | 3.26 | 5.57 | 9.25 | 13,320 | 0.6 |
| 17 | 00000221_apr082014_161927PM | 54,501 | 178.8 | 3748 | 2558 | 4 | 1 | 1 | 6 | 1.28 | 1.41 | 6.28 | 8.97 | 12,917 | 0.6 |
| 18 | 00000378_apr242014_153826PM | 54,592 | 179.1 | 3673 | 1963 | 5 | 1 | 1 | 7 | 1.91 | 2.67 | 4.10 | 8.68 | 12,499 | 0.5 |
| 19 | 00000348_apr222014_133601PM | 27,494 | 90.2 | 1975 | 1466 | 2 | 1 | 1 | 4 | 0.55 | 1.23 | 5.37 | 7.15 | 10,296 | 0.5 |
| 20 | 00000385_apr252014_095246AM | 36,018 | 118.2 | 5388 | 1884 | 13 | 2 | 0 | 15 | 4.22 | 2.78 | - | 7.00 | 10,080 | 0.4 |
| 21 | 00000190_apr022014_113039AM | 67,015 | 219.9 | 3963 | 2829 | 3 | 0 | 1 | 4 | 2.21 | - | 4.15 | 6.36 | 9,158 | 0.4 |
| 22 | 00000183_apr012014_165922PM | 44,817 | 147.0 | 2412 | 1856 | 0 | 0 | 1 | 1 | - | - | 6.10 | 6.10 | 8,784 | 0.4 |
| 23 | 00000374_apr242014_122905PM | 48,327 | 158.6 | 3347 | 2650 | 2 | 2 | 0 | 4 | 0.46 | 5.40 | - | 5.86 | 8,438 | 0.4 |
| 24 | 00000177_apr012014_135222PM | 22,649 | 74.3 | 2888 | 1203 | 1 | 1 | 0 | 2 | 0.46 | 3.98 | - | 4.44 | 6,394 | 0.3 |
| 25 | 00000358_apr232014_095823AM | 50,197 | 164.7 | 3482 | 2251 | 12 | 0 | 0 | 12 | 4.14 | - | - | 4.14 | 5,962 | 0.3 |
| 26 | 00000332_apr172014_140957PM | 60,254 | 197.7 | 3546 | 2625 | 5 | 1 | 0 | 6 | 1.49 | 2.62 | - | 4.11 | 5,918 | 0.3 |
| 27 | 00000172_apr012014_092348AM | 30,097 | 98.7 | 3172 | 1300 | 6 | 1 | 0 | 7 | 2.78 | 1.04 | - | 3.82 | 5,501 | 0.2 |
| 28 | 00000245_apr112014_144404PM | 73,151 | 240.0 | 4118 | 3754 | 0 | 1 | 0 | 1 | - | 2.91 | - | 2.91 | 4,190 | 0.2 |
| 29 | 00000330_apr172014_113224AM | 30,913 | 101.4 | 3023 | 1479 | 4 | 1 | 0 | 5 | 1.68 | 1.18 | - | 2.86 | 4,118 | 0.2 |
| 30 | 00000352_apr222014_151801PM | 49,594 | 162.7 | 5153 | 3053 | 1 | 1 | 0 | 2 | 0.37 | 2.37 | - | 2.74 | 3,946 | 0.2 |
| 31 | 00000174_apr012014_110812AM | 39,033 | 128.1 | 2568 | 1801 | 1 | 2 | 0 | 3 | 0.19 | 2.41 | - | 2.60 | 3,744 | 0.2 |
| 32 | 00000182_apr012014_165448PM | 20,352 | 66.8 | 4805 | 936 | 5 | 1 | 0 | 6 | 1.33 | 1.24 | - | 2.57 | 3,701 | 0.2 |
| 33 | 00000197_apr022014_153244PM | 79,477 | 260.8 | 4365 | 3464 | 1 | 1 | 0 | 2 | 0.10 | 2.10 | - | 2.20 | 3,168 | 0.1 |
| 34 | 00000193_apr022014_133540PM | 70,465 | 231.2 | 4026 | 2633 | 5 | 1 | 0 | 6 | 0.99 | 1.13 | - | 2.12 | 3,053 | 0.1 |
| 35 | 00000345_apr222014_113115AM | 20,260 | 66.5 | 3551 | 1122 | 1 | 1 | 0 | 2 | 0.45 | 1.35 | - | 1.80 | 2,592 | 0.1 |
| 36 | 00000244_apr112014_143559PM | 40,704 | 133.5 | 1852 | 1509 | 10 | 0 | 0 | 10 | 1.75 | - | - | 1.75 | 2,520 | 0.1 |
| 37 | 00000220_apr082014_151116PM | 64,574 | 211.9 | 9922 | 3494 | 1 | 1 | 0 | 2 | 0.34 | 1.19 | - | 1.53 | 2,203 | 0.1 |
| 38 | 00000173_apr012014_100117AM | 115,343 | 378.4 | 6482 | 4531 | 2 | 0 | 0 | 2 | 1.36 | - | - | 1.36 | 1,958 | 0.1 |
| 39 | 00000326_apr172014_091952AM | 57,103 | 187.3 | 4196 | 2728 | 1 | 1 | 0 | 2 | 0.30 | 1.03 | - | 1.33 | 1,915 | 0.1 |
| 40 | 00000192_apr022014_132822PM | 63,978 | 209.9 | 3648 | 2845 | 2 | 0 | 0 | 2 | 1.20 | - | - | 1.20 | 1,728 | 0.1 |
| 41 | 00000196_apr022014_152354PM | 81,842 | 268.5 | 5030 | 4021 | 4 | 0 | 0 | 4 | 1.19 | - | - | 1.19 | 1,714 | 0.1 |
| 42 | 00000184_apr022014_083802AM | 14,911 | 48.9 | 2510 | 921 | 3 | 0 | 0 | 3 | 1.13 | - | - | 1.13 | 1,627 | 0.1 |
| 43 | 00000185_apr022014_092136AM | 70,228 | 230.4 | 3519 | 2510 | 2 | 0 | 0 | 2 | 0.92 | - | - | 0.92 | 1,325 | 0.1 |
| 44 | 00000222_apr082014_165915PM | 27,281 | 89.5 | 2991 | 1429 | 2 | 0 | 0 | 2 | 0.90 | - | - | 0.90 | 1,296 | 0.1 |
| 45 | 00000236_apr112014_085748AM | 51,013 | 167.4 | 3920 | 2561 | 2 | 0 | 0 | 2 | 0.86 | - | - | 0.86 | 1,238 | 0.1 |
| 46 | 00000246_apr112014_144719PM | 8,035 | 26.4 | 1175 | 374 | 2 | 0 | 0 | 2 | 0.78 | - | - | 0.78 | 1,123 | 0.0 |
| 47 | 00000363_apr232014_141617PM | 47,740 | 156.6 | 4175 | 2717 | 2 | 0 | 0 | 2 | 0.67 | - | - | 0.67 | 965 | 0.0 |
| 48 | 00000167_mar312014_161327PM | 62,002 | 203.4 | 3792 | 2760 | 2 | 0 | 0 | 2 | 0.54 | - | - | 0.54 | 778 | 0.0 |
| 49 | 00000325_apr172014_085541AM | 35,995 | 118.1 | 5248 | 2007 | 1 | 0 | 0 | 1 | 0.52 | - | - | 0.52 | 749 | 0.0 |
| | | 2,657,420 | 8,718.6 | 196,187 | 121,527 | 157 | 34 | 25 | 216 | 57.35 | 75.98 | 199.88 | 333.21 | 479,822 | 21.0 |

Hamilton Municipal Utility Authority, Pennsylvania Adopts Electro Scan for Sewer Condition Assessment

Despite its size of approximately 70 miles of sewer main, Hamilton Township Municipal Authority (HTMA) pursues innovative solutions using in-house staff to manage its wastewater collection system.

Led by Sharon Purnell, Manager, HTMA provides wastewater services to about 4,000 homes and 120 commercial accounts around Chambersburg, PA. Utilizing its own crews, including cleaning and TV equipment, HTMA has purchased Electro Scan's ES-620 to add to their existing CCTV truck, after undertaking a successful benchmark.

Representing a relatively young system, ranging from 30-40 years old, HTMA still experiences I&I issues that had been difficult to locate & measure with existing solutions.

Electro Scan wishes to thank Sharon Purnell and Board Members at HTMA for their hospitality and Electro Scan sales order.



Electro Scan HTMA Benchmark Project

| Manhole From | Manhole To | Scan ID | Record Date | Distance (ft) | Number of Defect Counts | | | | Total GPM | | | | |
|---------------------------------------|------------|---------|----------------------------------|---------------|-------------------------|--------|-------|-------|-----------|----------|-------|-------|---------------|
| | | | | | Small | Medium | Large | Total | Minor | Moderate | Large | Total | |
| 1 | P01E14 | P01E11 | dou1_00000080_may222014_672530AM | 5/21/2014 | 280 | 130 | 15 | 5 | 150 | 40.96 | 55.31 | 4.31 | 100.58 |
| 2 | P01E13 | P01E11 | dou1_00000081_may222014_080016AM | 5/21/2014 | 345 | 103 | 8 | 4 | 115 | 35.35 | 32.68 | 5.08 | 73.11 |
| 3 | P01E13 | P01E14 | dou1_00000079_may222014_084132AM | 5/21/2014 | 230 | 63 | 11 | 2 | 76 | 26.40 | 20.18 | 21.35 | 67.93 |
| 4 | P01E09 | P01E06 | dou1_00000082_may222014_084520AM | 5/21/2014 | 215 | 46 | 5 | 2 | 53 | 13.00 | 20.19 | 10.60 | 43.99 |
| 5 | 2A07 | 2A06 | dou1_00000070_may212014_171427AM | 5/20/2014 | 280 | 12 | 1 | 3 | 16 | 5.84 | 10.09 | 0.00 | 15.93 |
| 6 | 2A06 | 2A05 | dou1_00000076_may212014_080210AM | 5/20/2014 | 305 | 13 | 0 | 0 | 13 | 2.89 | 0.00 | 0.00 | 2.89 |
| 7 | P04A04 | P04A03 | dou1_00000076_may212014_122048PM | 5/20/2014 | 285 | 1 | 4 | 1 | 6 | 2.37 | 0.00 | 0.00 | 2.37 |
| 8 | 2A04 | 2A03 | dou1_00000073_may212014_091914AM | 5/20/2014 | 395 | 10 | 0 | 1 | 11 | 2.25 | 0.00 | 0.00 | 2.25 |
| 9 | 2A05 | 2A04 | dou1_00000072_may212014_091458AM | 5/20/2014 | 100 | 4 | 0 | 1 | 5 | 1.44 | 0.00 | 0.00 | 1.44 |
| 10 | P04A07 | P04A04 | dou1_00000075_may212014_115432AM | 5/20/2014 | 265 | 1 | 0 | 1 | 2 | 0.09 | 1.20 | 0.00 | 1.29 |
| 11 | P04A02 | P04A01 | dou1_00000078_may212014_132127PM | 5/20/2014 | 290 | 2 | 0 | 0 | 2 | 0.25 | 0.00 | 0.00 | 0.25 |
| 12 | P04A03 | P04A02 | dou1_00000077_may212014_125447PM | 5/20/2014 | 85 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total Group Defect Flow (GPM): | | | | | | | | | | | | | 332.07 |

Section 1, Completed Thursday May 22
 Section 2, Completed Wednesday May 21
 Section 3, Completed Wednesday May 21

Field Dates: May 21 & 22, 2014

Contact:
 Sharon Purnell, Manager
 Hamilton Township Municipal Authority
 1270 Crottestown Road
 Chambersburg, PA 17202
 Tel: 717-264-8959



(Above) Macy Grubb, Manager of Field Services presents Electro Scan results to the HTMA Board in Chambersburg, PA, June 17, 2014.

US EPA Region 3, PA DEP, and LASA Sponsor Electro Scan-CCTV Benchmark



Electro Scan wishes to thank the US EPA, Commonwealth of Pennsylvania Department of Environmental Protection (DEP), and Lancaster Area Sewer Authority (LASA), for inviting Electro Scan to demonstrate and benchmark its solutions.

LASA currently owns, operates, and maintains a sanitary sewer system that serves approximately 32,500 customers representing a population of about 107,000, located in seven Lancaster County municipalities including East Hempfield Township, West Hempfield Township, Lancaster Township, Manor Township, Manheim Township, East Petersburg Borough and Mountville Borough. The LASA system includes approximately 500 miles of pipeline, 38 pumping stations, and a treatment facility designed to treat 15 million gallons of wastewater per day.

Sample Electro Scan CCTV Comparison MCE-10 to L61

| Manhole | Estimated Infiltration Flow (Total) | CCTV Callout |
|-----------------|-------------------------------------|-------------------------|
| 94-96' (CCTV) | 1.6 GPM | None |
| 90-92' (ES) | 6.2 GPM | TFA |
| 155-157' (CCTV) | 2.6 GPM | Circumferential |
| 153-155' (ES) | 1.2 GPM | Infiltration: Gusher |
| 172' (CCTV) | 0.8 GPM | Infiltration: Discharge |
| 168' (ES) | 0.3 GPM | Infiltration: Runner |
| 376' (CCTV) | 1.2 GPM | Infiltration: Discharge |
| 369' (ES) | 0.3 GPM | Infiltration: Runner |
| 381' (CCTV) | 0.8 GPM | Infiltration: Discharge |
| 374' (ES) | 0.3 GPM | Infiltration: Runner |
| 386' (CCTV) | 0.3 GPM | Infiltration: Runner |
| 379' (ES) | 0.3 GPM | Infiltration: Runner |

| Sewer Segment | CCTV | | | ELECTRO SCAN | | | | Total GPM | Total Gallons Per Day |
|---------------|------------|----------|----------|--------------|--------------|--------------|--------------|--------------|-----------------------|
| | Structural | O&M | Overall | Small | Med | Large | Total | | |
| MCE-10 - L61 | 35 | 4 | 4 | 35 | 6.53 | 1.79 | 0.00 | 8.32 | 32,918 |
| L432 - L431 | 34 | 0 | 1 | 35 | 6.53 | 1.79 | 0.00 | 8.32 | 11,981 |
| MCE-8 - MCE-6 | 21 | 0 | 0 | 21 | 4.30 | 0.00 | 0.00 | 4.30 | 6,192 |
| TOTAL | 90 | 5 | 5 | 104 | 20.51 | 13.35 | 33.90 | 67.76 | 97,574 |

Electro Scan Defect Count 104
CCTV Defect Count 26

ELECTRO SCAN

| Sewer Segment | Number of Defects | | | | GPM Flow | | | | |
|---------------|-------------------|----------|----------|------------|--------------|--------------|--------------|--------------|-----------------------|
| | Small | Med | Large | Total | Minor | Mod | Severe | Total GPM | Total Gallons Per Day |
| MCE-8 - MCE-6 | 0 | 1 | 4 | 5 | 0.69 | 3.87 | 27.72 | 32.28 | 46,483 |
| MCE-10 - L61 | 35 | 4 | 4 | 43 | 8.99 | 7.69 | 6.18 | 22.86 | 32,918 |
| L432 - L431 | 34 | 0 | 1 | 35 | 6.53 | 1.79 | 0.00 | 8.32 | 11,981 |
| L431 - L80 | 21 | 0 | 0 | 21 | 4.30 | 0.00 | 0.00 | 4.30 | 6,192 |
| TOTAL | 90 | 5 | 9 | 104 | 20.51 | 13.35 | 33.90 | 67.76 | 97,574 |

Sample Electro Scan CIPP Assessment MCE-8 to MCE-6

| Segment | Defect Count | Defect Length | Defect Severity | Estimated Infiltration Flow (Total) |
|----------------|--------------|---------------|-----------------|-------------------------------------|
| MCE-8 to MCE-6 | 104 | 104 | 104 | 67.76 GPM |



Add Electro Scan to your CCTV truck and switch from televising to electro scanning, and back again, in less than ten minutes!



Special Thanks
From The Electro Scan Team

US EPA Region 3
 Steve Maslowski, NPDES Enforcement
 Walter Higgins, Environmental Scientist
 Joy Gillespie
 Allison Graham

Pennsylvania Department of Environmental Protection (DEP)
 Bob DiGillamo, Section Chief
 Paul Curry, Water Program Specialist
 Shawn Barbaugh, Operations Chief

Lancaster Area Sewer Authority, PA
 Mike Kyle, Executive Director
 Alcot Knepp, Maintenance Director
 John Vilga, Maintenance Director
 Tom Millhouse, Collection Operator
 Pete Hartmann, Engineering Support Tech

MTech: Electro Scan's Dealer of the Year



From Left to Right: Bryan Cohen, Justin Cira, Mark Grabowski, Chris Cira, Macy Grubbs, Dan Soukup, Evan Tierney, and Don Houck. MTech, 7401 First Place, Bedford, Ohio 44146, Tel: 800-362-0240, Website: <http://www.mtechcompany.com>.

Summer Interns Help Electro Scan Overhaul Legacy SSES and CIPP Inspection Standards

Projects, Reports & Presentations Make New Breed of 'Road Warriors'

Electro Scan was delighted to welcome its 2014 Class of Summer Interns, drawn mostly from the California State University, Sacramento, School of Engineering.

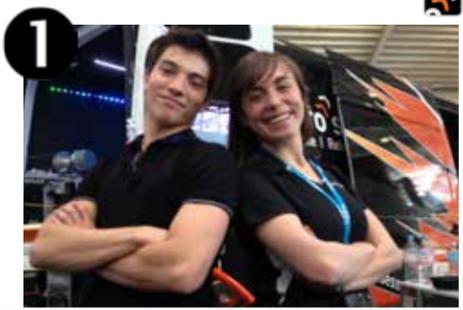
& Learns' sessions with engineering firms, and managed our data capture and field set-up for demonstration projects in Boston (MA), Tallahassee (FL), Pompano Beach (FL), and Vallejo (CA)."

Jamie Johnson, returning intern, was joined by Susan Aguirre, Juan Ponce, and Louis Fournier, joining the Electro Scan team, working side-by-side with our staff.

Electro Scan thanks all its customers, dealers, and prospects for allowing us to have our summer staff work side-by-side on their projects.

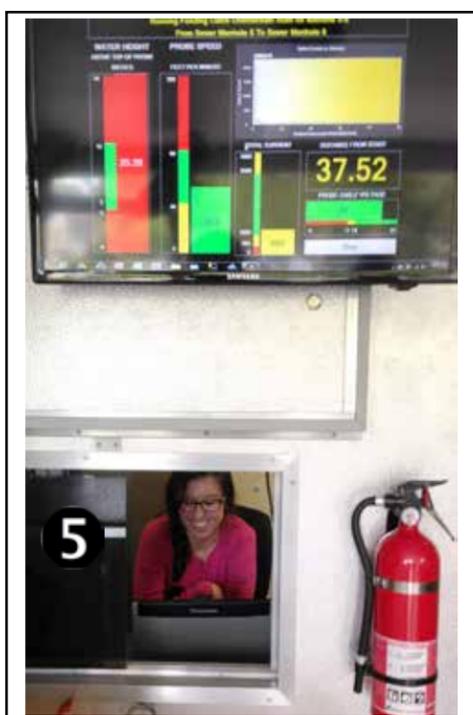
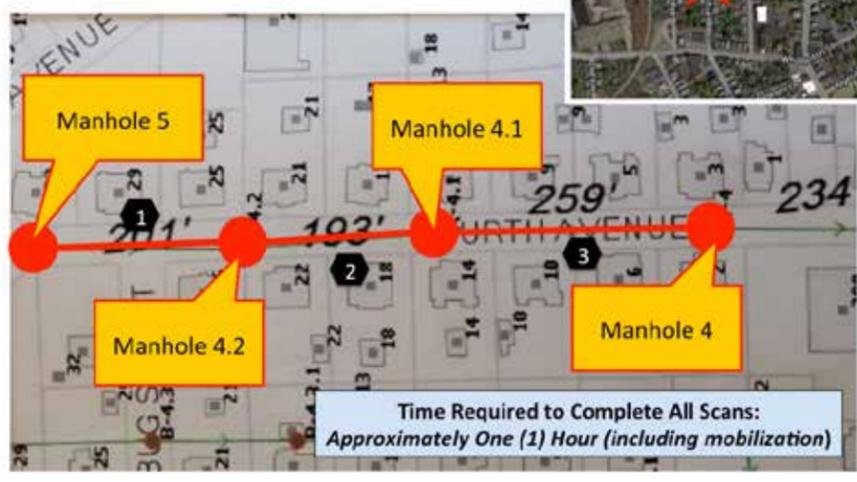
"Our summer analysts are more than just interns," stated Chuck Hansen, Chairman, Electro Scan, "they help us communicate with other newly minted professional engineers to influence their organizations."

"Our summer staff has done it all," stated Mark Grabowski, VP, Electro Scan. "They have supported us in Germany at the IFAT exposition, made presentations during 'Lunch



1. Louis Fournier and Jamie Johnson, 2. Susan Aguirre, 3. Juan Ponce, 4. Jamie Johnson, 5. Susan Aguirre.

Benchmark Location CCTV v. Electro Scan



| VEOLIA | | electro scan inc. | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------|----------|-------------------|----------|----------|----------|-------------------|----------|----------|----------|----------|----------|----------|----------|-----------------------|----------|----------|----------|-----------|------------|-----------|-----------|------------|--------------|--------------|--------------|---------------|----------------|
| Structural | | O&M | | Overall | | Number of Defects | | | GPM Flow | | | | | | | | | | | | | | | | | | |
| Index | Score | Index | Score | Index | Score | Small | Med | Large | Total | Minor | Med | Severe | Total | Total Gallons Per Day | | | | | | | | | | | | | |
| MH 5-MH 4.2 | 3 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 40 | 7 | 5.7 | 14.70 | 6.05 | 10.92 | 31.49 | 45,344 | | | | | | | | | | | | | |
| MH 4.2-MH 4 | 3 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 14 | 2 | 3.9 | 31.70 | 27.56 | 13.20 | 70.24 | 101,856 | | | | | | | | | | | | | |
| MH 4.2-MH 4.1 | 3 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 11 | 2 | 1.1 | 42.21 | 20.75 | 33.87 | 76.72 | 110,920 | | | | | | | | | | | | | |
| MH 4.1-MH 4 | 3 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 14 | 10 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | | | | | | | | | | | | | |
| TOTAL | 4 | 6 | 3 | 0 | 5 | 18 | 0 | 8 | 0 | 0 | 0 | 0 | 4 | 14 | 3 | 0 | 5 | 26 | 199 | 65 | 11 | 275 | 88.49 | 54.26 | 36.23 | 178.98 | 257,732 |

ASTM F2550-13: International Standard Covering Electro Scanning Is Approved Through 2019

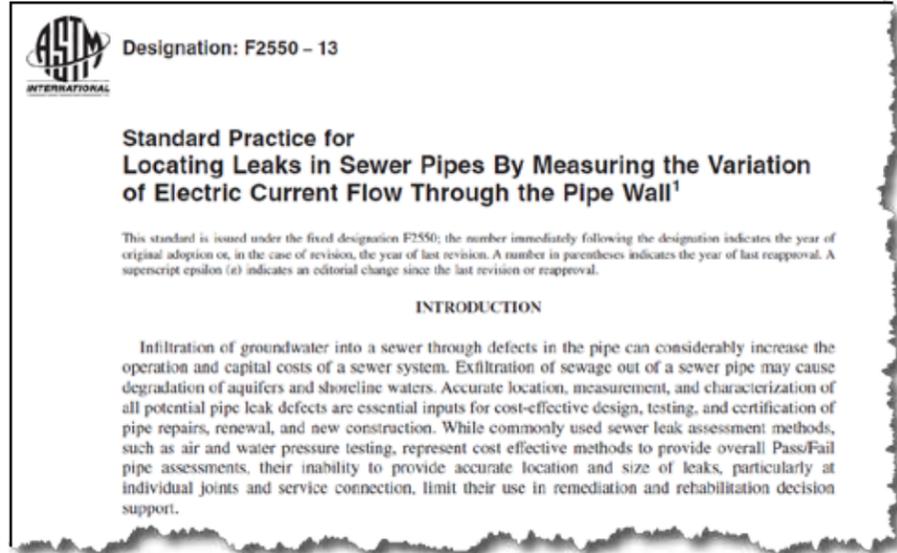
Electro Scan is delighted to see leading sewer utilities modify their specifications for sewer evaluations to incorporate its just approved ASTM F2550-13, Standard for Locating Leaks in Sewer Pipes to Measuring the Variation of Electric Current Flow Through the Pipe Wall.

First established in 2006, ASTM F2550 governs the use of electrical current to assess pipes. Providing a groundbreaking specification that described a modern sewer assessment tool, the initial standard included key terminology, principles of operation, procedures, description of apparatus, data descriptions, and reporting

that added a recommended use to assess repairs, rehabilitation, and replacement of pipes, *before* and *after* their renewal. Winning unanimous approval, the new standard, F2550-13 became immediately effective.

Today, ASTM has emerged as the dominant rule-making society among standards developers in the USA and represents the largest developer of standards in the world.

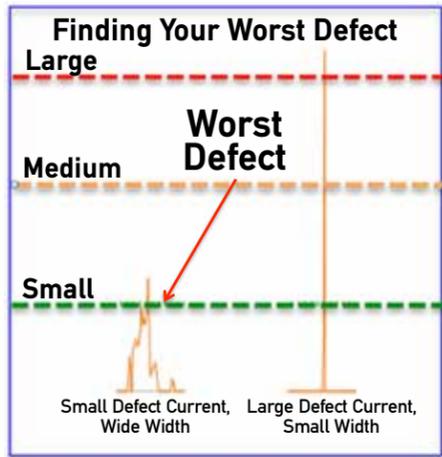
ASTM supports thousands of volunteer technical committees, which draw their members from around the world to col-



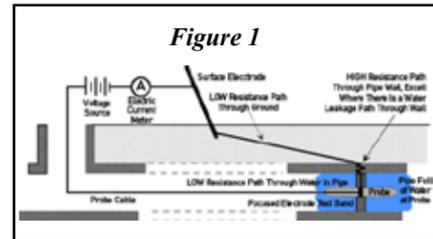
standards. ASTM F2550-06 ensured that consulting engineers & contractors provided consistent and meaningful results (Figure 1).

Headquartered just 5 miles northwest of Philadelphia, ASTM, was founded in 1898 as the American Section of the International Association for Testing and Materials -- pre-dating other venerable standards-making societies, including BSI (1901), DIN (1917), ANSI (1918) and AFNOR (1926).

In November 2013, modifications to F2550-06 were introduced and approved



lectively develop and maintain more than 12,000 standards.



ASTM F2550 is administered by Committee F36 on Technology and Underground Utilities, which is overseen by Dr. Jey K. Jeyapala, Chairman.

ASTM F2550 is specifically part of the F36.20 Inspection and Renewal of Water and Wastewater Infrastructure roster.

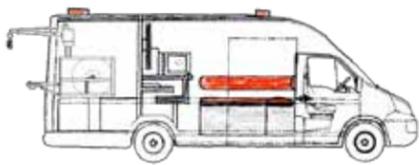
In early 2014, Chuck Hansen was appointed the new Chairman of Sub-Committee F36.20, where he is helping other innovative technologies and renewal methods gain ASTM certification.

“Our mission is to help utilities, consulting engineers, and contractors understand key aspects of the [ASTM] standards,” states Chuck Hansen, ASTM Chairman, F36.20, “and, help transition the industry to more accurately inspect and renew their water and sewer infrastructure.”

| CCTV & Electro Scan | | CCTV | Electro Scan |
|---------------------|---|---------|--------------|
| 1 | Automatically Finds Potential Sources of Infiltration | N | Y |
| 2 | Automatically Finds Leaks Inside Joints | N | Y |
| 3 | Automatically Finds Leaks at Service Connections | N | Y |
| 4 | Automatically Finds Sources of Infiltration at Cracks | N | Y |
| 5 | Automatically Finds Leak Locations (within 0.4 in or 1 cm) | N | Y |
| 6 | Automatically Measures Size of Leaks (Est. GPM or LPM) | N | Y |
| 7 | Automatically Finds Defects That Leak from Bad Couplings | N | Y |
| 8 | Automatically Finds Defects That May Still Leak After Repairs | N | Y |
| 9 | Automatically Finds Defects That Leak in Re-Lining Projects | N | Y |
| 10 | Automatically Finds Defects After Service Re-Connections | N | Y |
| 11 | Automatically Finds Leaks, If Silt or Debris on Bottom of Pipe | N | Y |
| 12 | Able to Conduct Inspections, If Sewer Pipe Is Full of Water | N | Y |
| 13 | Able to Determine Size of Potential Leak, If Roots Are Present | N | Y |
| 14 | Automatically Finds Leaks at Joints, If Grease Is Present | N | Y |
| 15 | Able to Determine Size of Leaks, If Pipe Has Encrustation | N | Y |
| 16 | Requires Active Infiltration to Identify Defect at Source | Y | N |
| 17 | Contains Moving Parts That Could Clog from Debris or Silt | Y | N |
| 18 | Requires Bypass During Inspection, If Pipe Full | Y | N |
| 19 | Requires Special Training and Certification to Identify Defects | Y | N |
| 20 | Relies on Visual Observations to Record Defects | Y | N |
| 21 | Ave. Speed of Inspection (6-20" Sewer Main) | 1m /min | 15m /min |

| Kanalinspektion & Electro Scan | | Kanal TV | Electro Scan |
|--------------------------------|--|----------|--------------|
| 1 | Ortet automatisch potentielle Infiltrationsstellen | N | Y |
| 2 | Ortet automatisch Lecks in Verbindungsstellen | N | Y |
| 3 | Ortet automatisch Lecks in Hausanschlüssen | N | Y |
| 4 | Ortet automatisch mögliche Infiltrationsstellen an Rissen und Brüchen | N | Y |
| 5 | Ortet Leckagestellen automatisch (d. h. auf 1 cm genau) | N | Y |
| 6 | Misst automatisch die Grösse der Lecks (d. h. in Liter pro Minute) | N | Y |
| 7 | Ortet automatisch Leckschäden an schlechten Muffen und mangelhaften Armaturen | N | Y |
| 8 | Ortet automatisch reparierte Schäden, durch die noch etwas durchsickern könnte | N | Y |
| 9 | Ortet automatisch Leckschäden bei Lining-Projekten | N | Y |
| 10 | Ortet automatisch nach Wiederinbetriebnahme der Leitungen auftretende Schäden | N | Y |
| 11 | Ortet automatisch Leckagen bei Schlamm oder Ablagerungen auf dem Boden der Leitung | N | Y |
| 12 | Kann Inspektionen durchführen, wenn die Abwasserleitung mit Wasser gefüllt ist | N | Y |
| 13 | Kann die Grösse eines potentiellen Lecks feststellen, wenn Wurzeln eingedrungen sind | N | Y |
| 14 | Ortet automatisch Lecks an Verbindungsstellen, an denen Fette und Öle vorhanden sind | N | Y |
| 15 | Kann die Grösse eines Lecks feststellen, wenn die Leitung Verkrustungen aufweist | N | Y |
| 16 | Leitung muss gespült werden, damit der Schaden vor Ort erkannt werden kann | Y | N |
| 17 | Hat bewegliche Teile, die sich mit Schlamm oder Ablagerungen zusetzen und ausfallen können | Y | N |
| 18 | Erfordert bei gefüllter Leitung eine Bypass-Leitung während der Inspektion | Y | N |
| 19 | Erfordert spezielle Ausbildung und Zulassung zum Erkennen von Schäden | Y | N |
| 20 | Stützt sich auf optische Beobachtungen, um Art und Grösse des Schadens aufzuzeichnen | Y | N |
| 21 | Inspektionsgeschwindigkeit | 1m /min | 15m /min |

Electro Scan Attends International Conferences in England and Spain



16-18 September 2014
Peterborough Arena
Peterborough, England



13-15 October 2014
IFEMA Convention Centre
Madrid, Spain

Electro Scan Expands Product Suite To Assess Large Diameter Trunk Lines

The biggest drawback with using multi-sensor flotation devices, that cobble together CCTV cameras, sonar, and laser inspection tools, is that they either don't work or don't tell you anything.

fect flows in gallons per minute or litres per second, for large diameter sewers and interceptors.

In contrast, Electro Scan's international patent-pending low-voltage technology is the first major assessment tool to allow field operators to generate real-time defect locations, estimated de-

Available on as a contract service, directly from Electro Scan Services, contact Mark Grabowski at mark@electroscan.com for more information and pricing for your next project.



Poor Calif. Beach Water Quality Correlates With Rainfall, Sewer and Storm Flows

The National Resource Defense Council's annual analysis of water quality data at 3,485 coastal U.S. beaches monitored in 2013 found that 10% of all monitoring samples exceeded the EPA's most protective benchmark for assessing swimmer safety, known as the Beach Action Value (BAV), with contamination levels at the nation's beaches remaining unchanged from prior year's levels.

Working on a grant from California's State Water Resources Control Board, Mr. Anthony (Wai) Thoe of Stanford University has been investigating predictive models as a tool for public notification of beach water quality. Thoe's research included analytics from 17 California beaches with his findings showing a high correlation between rainfall events, sewer & stormwater flows and beach water quality. Mr. Thoe's past work had included similar efforts and the establishment of an ongoing monitoring and reporting of water quality at Hong Kong's 43 beaches.

Mr. Thoe's findings were presented at separate Northern and Southern California meetings of the State's Water Quality Monitoring Group, August 20 & 21, where Chuck Hansen also introduced the Electro Scan technology and ASTM F2550-13.

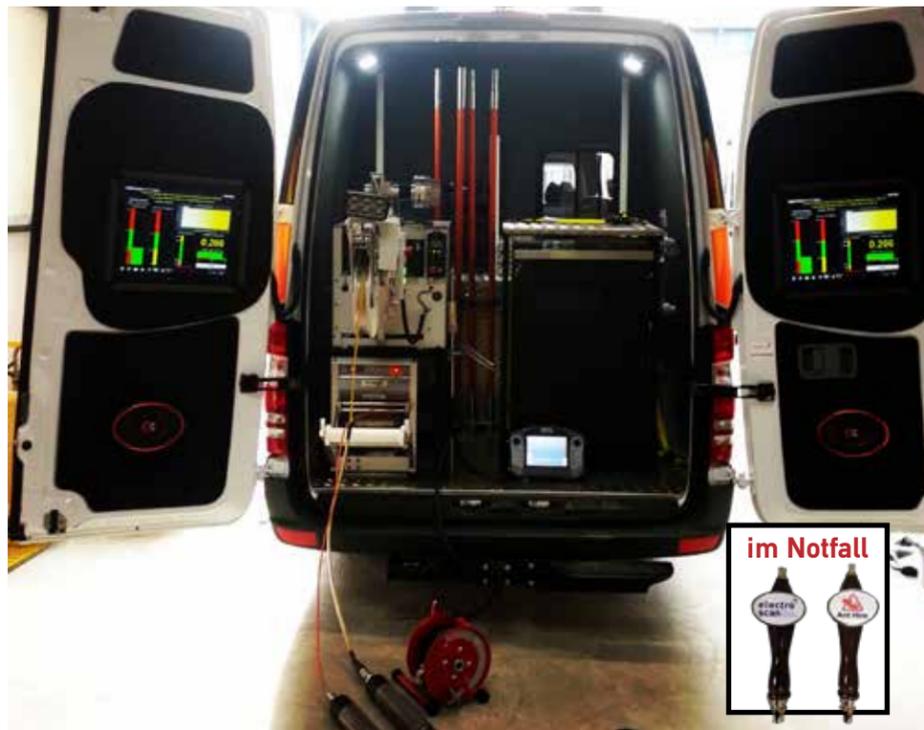
"Coastal sewers & storm drains represent unintended wastewater treatment resources," commented Chuck Hansen, CEO of Electro Scan. "As leaking pipes fill-up at high tide, effluent will typically leach out back into our coastal waterways at low tide."

"Since TV cameras televise pipes when they are dry, no defects are usually found, allowing for the cycle to continue." Stay tuned as more coastal communities start using Electro Scan to evaluate sewer and stormwater pipes to find & fix the correct leaks.



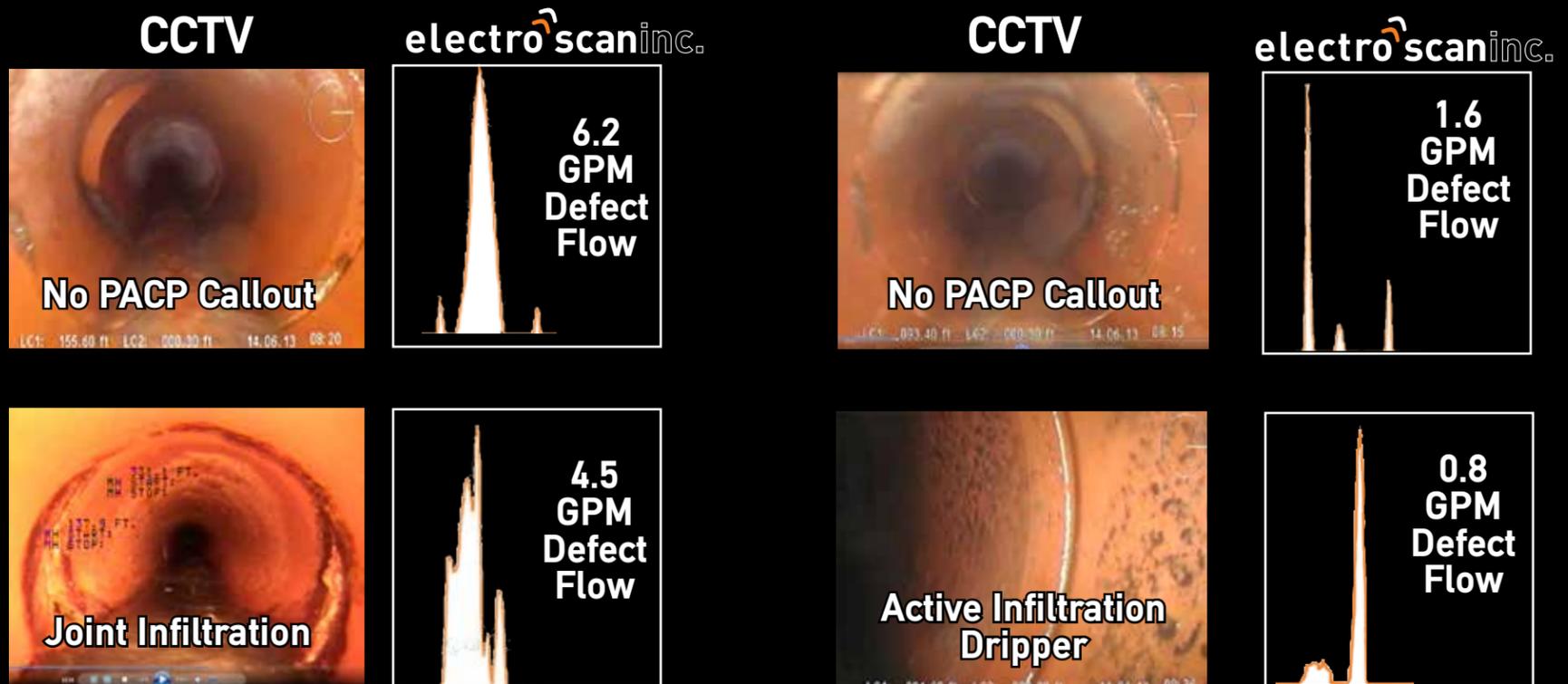
Source: National Resource Defense Council, August 2014.

Electro Scan (Europe) Limited Deploys EU & UK Demo Van For Projects & Trials



Electro Scan Technology

Pre-Rehabilitation Assessment ⁽¹⁾



No PACP coding or visual observations required as all readings are automatically collected during the scan and processed on the Cloud.

No third-party data interpretation needed.



(1) EPA Region 3 and Pennsylvania Department of Environmental Protection, CCTV and Electro Scan Benchmark, Lancaster, PA, May 20, 2014.

While Electro Scan doesn't replace CCTV, it does locate & measure defects not seen by CCTV, Acoustic Sensors, Smoke & Dye Tests, Sonar, GPR, or Laser Profilers.*

- CCTV can't see leaks in partially or full pipes,
- CCTV can't accurately identify or quantify defects inside joints,
- CCTV can't automatically calculate defect flows for cracks or bad connections,
- CCTV operators oftentimes rate the same defect, using different codes,
- CCTV operators frequently rate different defects, using the same code.

"Now we finally have a tool that can automatically find & measure defect flows, in GPM & LPS, for pre- and post-rehab'd sewer, stormwater & water pipes. Even smaller agencies with less than 100 miles of main are buying Electro Scan to add to their TV truck or CIPP lining specifications. So, don't get left behind."

Macy Grubbs, Director of Field Services
Electro Scan Inc.

* In accordance with ASTM F2550-13.

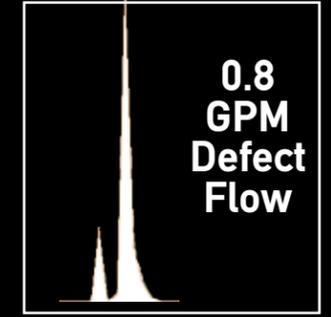
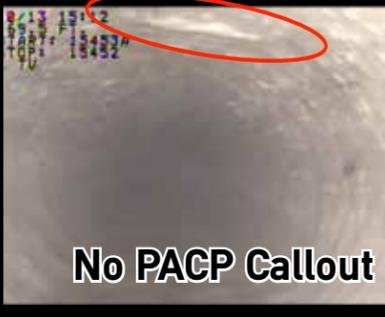
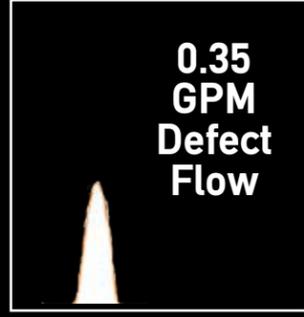
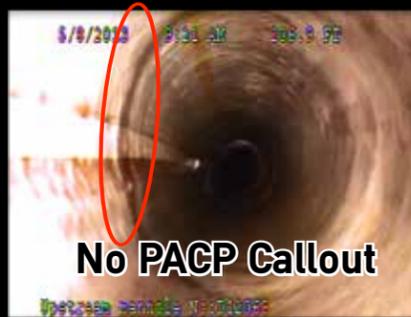
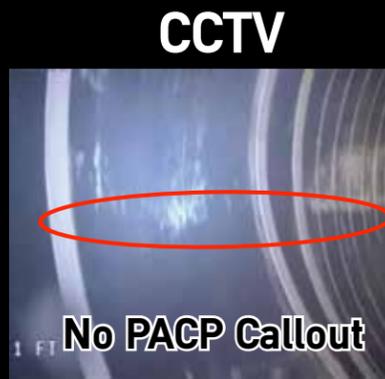
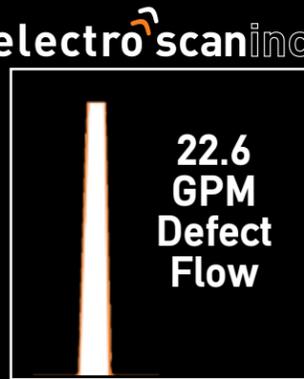
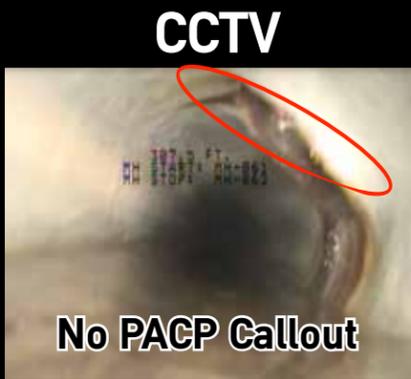
macy@electroscan.com



Macy Grubbs

is Changing Everything

Post-Rehabilitation Assessment ⁽²⁾



The Three Rs of Rehabilitation

| Program | Recover Capacity (I/I Reduction) | Repair Damage (Structural) | Reduce Maintenance |
|-------------------------|--|--|---------------------------------|
| Priorities | Capacity & Flow Analysis | Age, Condition, Etc. | Maintenance Records Review |
| Primary Approach | Replacement, Comprehensive | Point Repairs | MH-to-MH |
| Construction Approach | Traditional Bid | In-House | Retainer Contracts |
| Quantitative Analytics | Pre & Post-Rehabilitation Defect Flow Analysis | Pre & Post-Rehabilitation Defect Flow Analysis | Asset Management, CMMS, and GIS |
| Basis for Funding Level | Master Plan | Condition Assessment | Maintenance Records Review |

(2) Represents post-rehabilitation Electro Scan survey projects in 2013, with no defects identified by CCTV. In 2014, a major metropolitan sewer agency electro scanned forty-nine (49) post-CIPP sewer mains that were lined in the year 2000 (i.e. 14 years old).

100% showed defect flows, while 40% showed defect flows greater than 10,000 GPD, each, or 80% of total defect flows for all lined pipes.



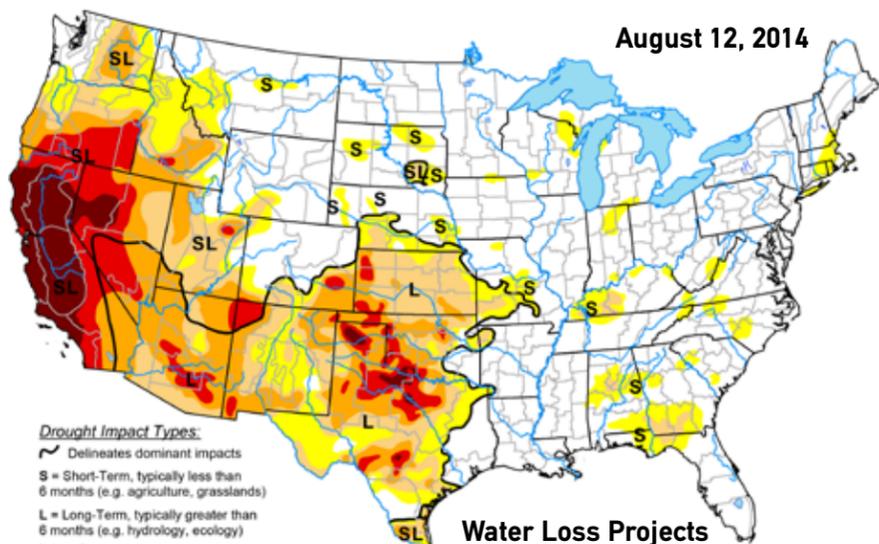
Switch from CCTV to Electro Scan, and back again - in the field - in less than 10 minutes.



US and international patents-pending.

www.ElectroScan.com

Electro Scan Offers Next Generation Leak Detection for Water Distribution



Water Loss Projects Begin Using Electro Scan

Electro Scan has officially launched its patent-pending technology in the water industry. In a sweeping change -- already seen in revised specifications, new projects, and partnerships with leading water companies -- Electro Scan has become the newest innovative technology in the field.

Recent projects include large & small water utilities in Arizona and California, using Electro Scan to quickly and accurately find leaks in water mains, irrigation canals, and transmission pipes, not detected using legacy acoustic sensors, fiber optic devices, or dewatered pipes using CCTV inspection.

Gearing up for expected demand for Electro Scan products from the State of California's \$11 billion Water Bond on the November 2014 ballot, look for Electro Scan to deploy its Critical Water® cloud application, similar to its Critical Sewer® app, to serve leading global water companies, with special focus on California water agencies.

Continued from Page 24

The U.S. EPA estimates that 700 water main breaks occur every day in the U.S. or 250,000 breaks a year. This represents water losses of 14 percent due to *known* leaks. That's not including the potentially larger source of water loss from *background leakage*, i.e. water losses from bad joints, cracks, and defective service connections that defy detection using conventional devices.

As experienced in the sewer industry, where CCTV is unable to find or measure leaks at joints or bad service connections, similar leaks in water mains are numerous & widespread, and not readily detected with current technologies.

Leak noise correlators, loggers, tracer gas techniques, ground penetrating radar, acoustic sensors, and newer fiber optic acoustic devices, are just some of the legacy inspection techniques that have been unable to consistently and reliably locate and measure (GPM or LPS) defect flows in non-conductive pipes.

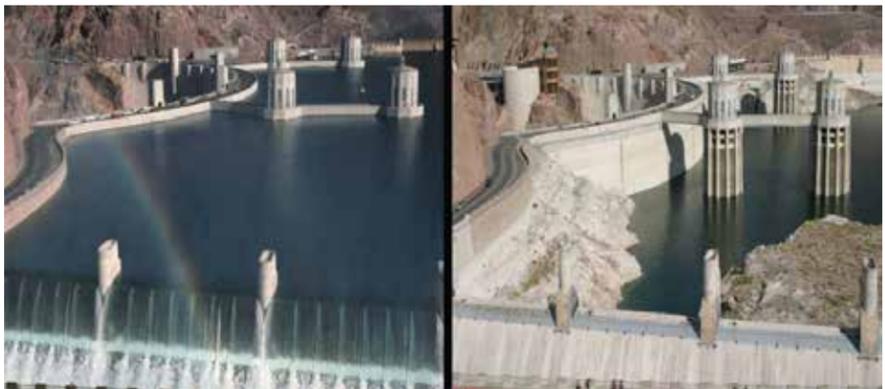
As stated in the 3rd Edition of AWWA M36, the majority of leaks and volume losses, worldwide, occur at customer service connections to the water main, and not in the core distribution system of a utility, yet standard acoustic listening devices are unable to reliably locate and prioritize many of these defects.

While pipe material, traffic load, depth of installation, age, ground conductions and water temperature are major factors in many main breaks, the quality of tap installation and material (e.g. in the past, lead and galvanized iron, to current copper and plastic pipe) connection to the water main cause the majority of 'real losses.'

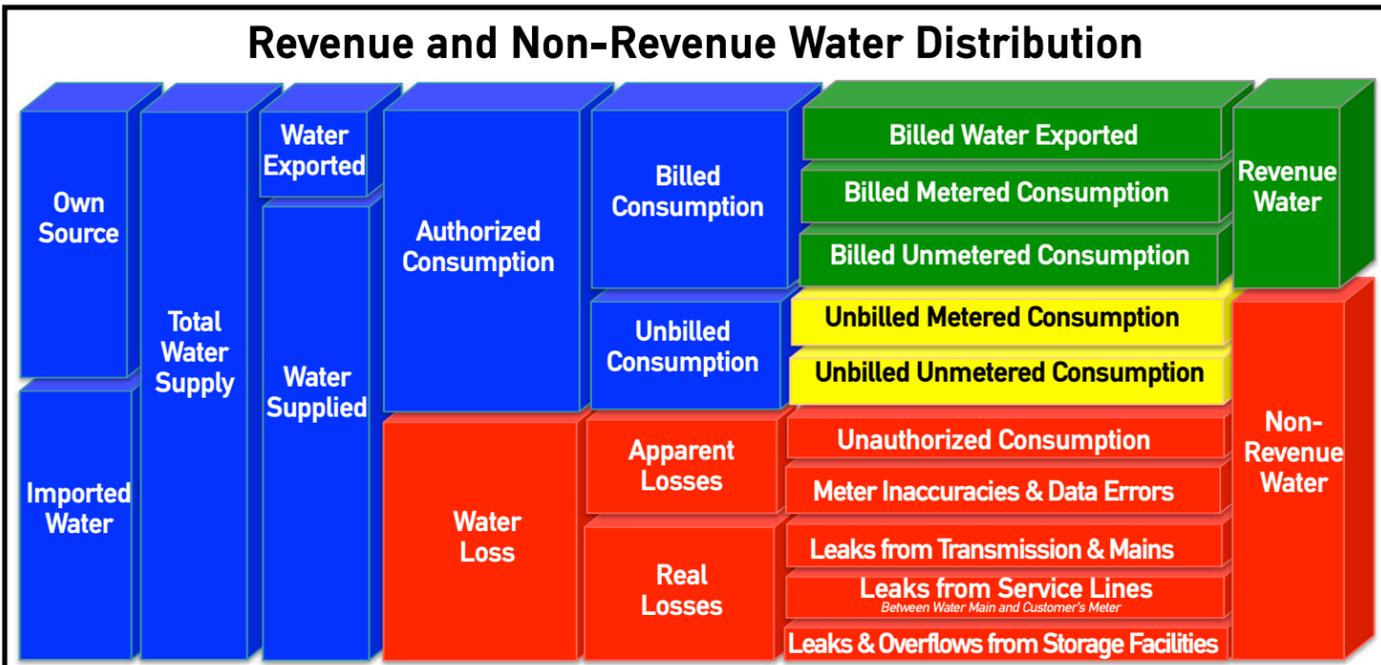
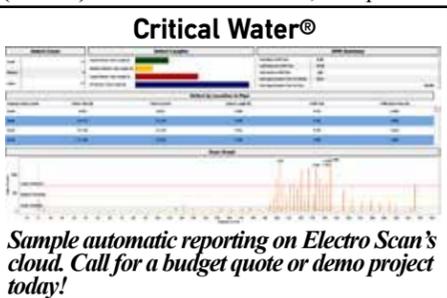
Since Electro Scan requires water to surround its probe, allowing its low voltage / high frequency technology to assess a pipe's wall, Electro Scan is well positioned to serve the worldwide water pipeline condition assessment market.



(Above) A dewatered water main undergoes TV inspection to attempt to locate leaks.



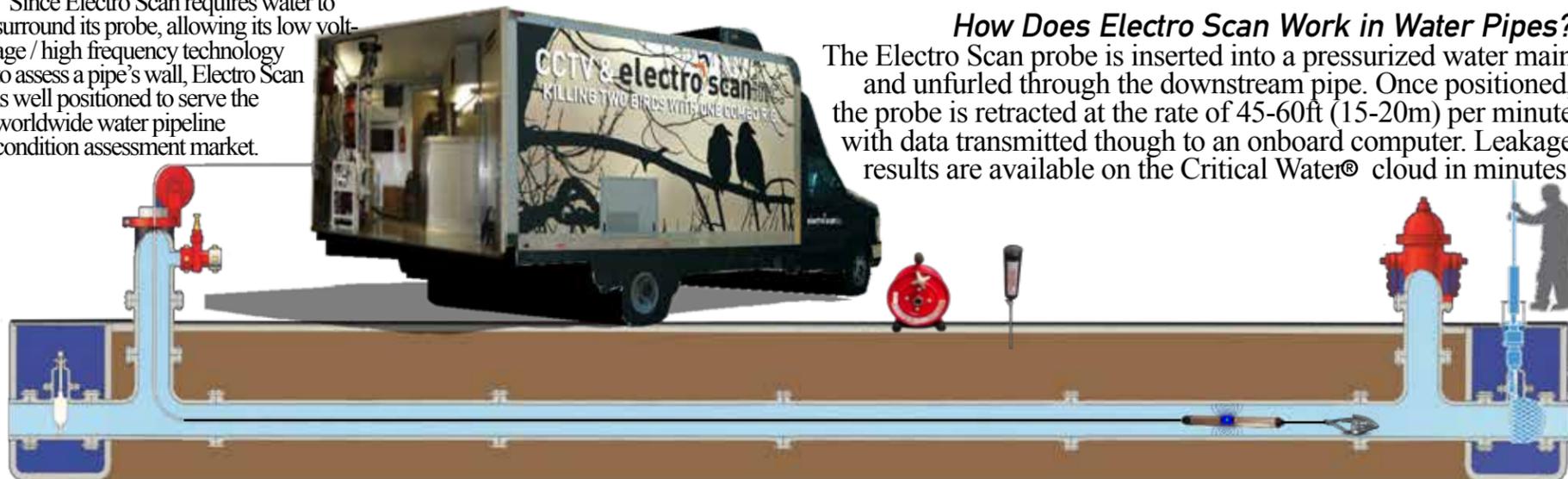
(Above) Hoover Dam in 2009, compared to Hoover Dam in July 2014.



Source: AWWA Water Audits and Loss Control Programs, Manual of Water Supply Practices, M36, 2009.

How Does Electro Scan Work in Water Pipes?

The Electro Scan probe is inserted into a pressurized water main and unfurled through the downstream pipe. Once positioned, the probe is retracted at the rate of 45-60ft (15-20m) per minute with data transmitted through to an onboard computer. Leakage results are available on the Critical Water® cloud in minutes.



International patents-pending.

Award-Winning Electro Scan IT Group Releases Version 3.0 Cloud Application

A major component of the Electro Scan solution is its groundbreaking cloud application -- Critical Sewers® and just announced Critical Water® -- that captures, stores, processes, and displays field data, in minutes.

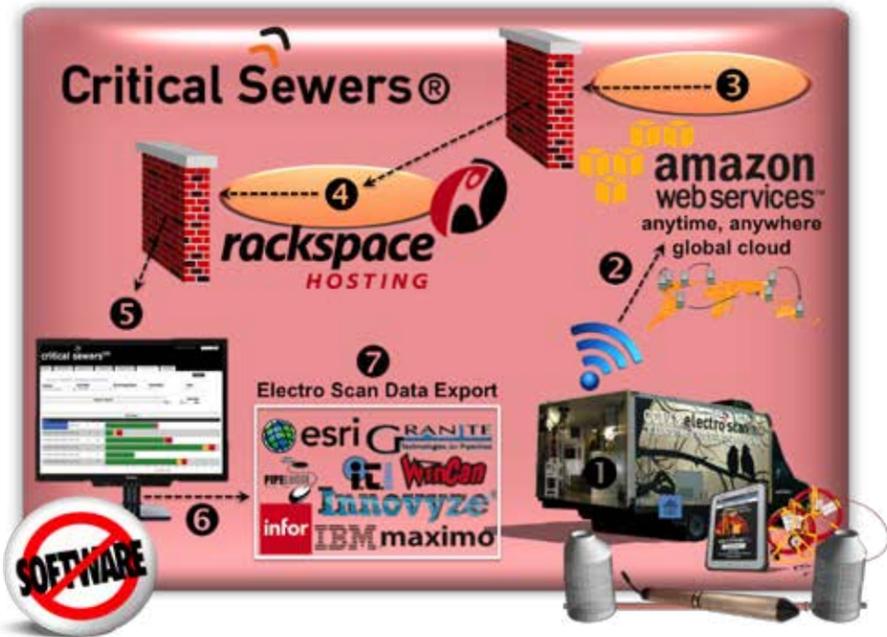
“Since I decided to come out of retirement to introduce Electro Scan to the global pipeline market, I thought I needed to pull my brother Scott out of retirement, too,” says Chuck Hansen. “A lot of people saw me as the face of Hansen since the early 1980s, but few people realize that the original Hansen Software Inc., founded in 1983 had three shareholders, each holding an equal stake: my father, Robert J. Hansen, Scott B. Hansen, and me.”

upgrades to our back-end systems), encompass a more powerful query application, including the ability to rank pipes by GPM (or LPS), pipe type, date, or number of defects.

Also included in our new release is a powerful export tab that allows you to more readily bring your Electro Scan data, via a separately licensed utility, to share with your Asset Management, CCTV, GIS, or Hydraulic Modeling applications.

Call or email Electro Scan’s IT group for more information or to talk about how we are changing the pipe condition market for the water and sewer industry.

“Our IT group not only writes & tests our code,” says Scott Hansen,



Critical Sewer & Water Cloud Apps

“It was nice being able to start a new multi-tenant (customer) architecture from the ground up,” states Scott Hansen, Electro Scan’s Chief Technology Officer. “I was immediately drawn to the Amazon Web Services (AWS) architecture to allow us to scale the application for both large and small users, wherever they were located on the globe.”

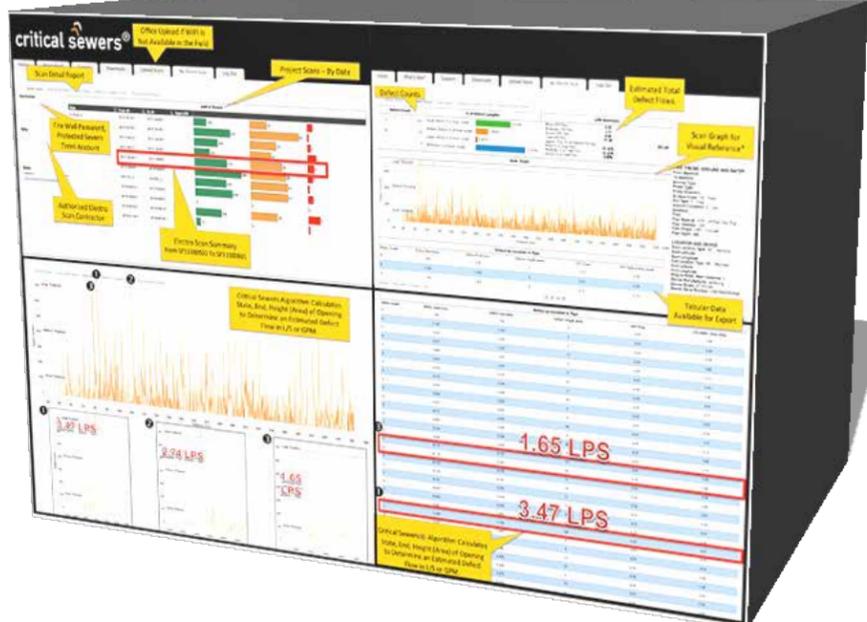
“Looking back, our Release 1.0 looked pretty crude compared to our new 3.X release available at WEFT-EC in New Orleans,” states Scott Hansen. “Today, we use HTML 5.0, Python, PHP, Tableau and SQL to capture, manage, validate, process, post, and warehouse the millions of monthly records our customers are already generating.”

Major enhancements (i.e. what your annual support agreement is allowing you to get as ongoing

“but also hits the field to watch how our customers and contractors are using our product.”



(Above) Keith Walda, Director of Technology,



Carissa Boudwin To Lead Electro Scan Marketing Team

Electro Scan is pleased to announce that Ms. Carissa Boudwin has joined California-based Electro Scan Inc. as Manager, Marketing & Sales Administration.

Moving back to Sacramento, CA after finishing her undergraduate degree at George Mason University, Fairfax, VA, Carissa earned her BS in Accounting while husband, Cody Boudwin, taught hand-to-hand combat at the Marine Corps Base, Quantico. Starting August 1, Carissa wasted no time heading to the field to get acquainted with the Field Operations team, meeting dealers, developing price quotations, and planning the next issue of the Electro Scan newsletter.

“I was very familiar with Chuck Hansen’s previous software company,” says Carissa Boudwin, “and couldn’t wait to help build traction in his new start-up.”

Carissa will be managing Electro Scan’s global advertising, product marketing, customer proposals, dealer price quotations, and tradeshows, in addition to her new role as Managing Editor of *The Critical Sewer & Water Chronicles*. “Email me your story ideas at carissa@electroscan.com and look for me at an upcoming exhibition in the U.S., England and Spain,” says Carissa.



(Above) Carissa Boudwin. (Below) Carissa’s new real-time tracking of Electro Scan’s demo trucks to direct more utilities to meet up with field crews.



Pete Dannenberg and Carissa Boudwin check the placement of an Electro Scan probe in Cleveland, Ohio.

Electro Scan Field Guide

| JOB SITE PREPARATION | | | | | | EQUIPMENT SET-UP | | | |
|----------------------|--|--|--|--|--|------------------|--|--|--|
|----------------------|--|--|--|--|--|------------------|--|--|--|

| | | | | | | | | | |
|-----------------|--------------------|-------------------------|-------------------|---------------------|------------------|--------------------|----------------------|-----------------------|-------------------------|
| 1. Job Planning | 2. Traffic Control | 3. CCTV to Electro Scan | 4. Grounding Reel | 5. Mainline Console | 6. Upstream Prep | 7. Downstream Prep | 8. Retrieve Jet Hose | 9. Attach Funnel Plug | 10. Jet Truck Operation |
|-----------------|--------------------|-------------------------|-------------------|---------------------|------------------|--------------------|----------------------|-----------------------|-------------------------|

| | | | | | | | | | |
|-------------|------------------------|--------------------------|-----------|---------------------|-------------------------|-----------------------|----------------------|--------------------------|--------------------------|
| a. Map Book | a. Deploy Safety Cones | a. Shut Down CCTV System | a. Set-Up | a. Co. Registration | a. Position Truck to MH | a. Remove Manhole Lid | a. Remove Jet Nozzle | a. Lubricate Funnel Plug | a. Begin Retracting Hose |
|-------------|------------------------|--------------------------|-----------|---------------------|-------------------------|-----------------------|----------------------|--------------------------|--------------------------|

| | | | | | | | | | |
|---------------------|--------------------------------|--------------------|-------------|-----------------------|----------------------------|-----------------------|-----------------------------|--|--|
| b. Map Sheet Review | b. Switch CCTV to Electro Scan | b. Grounding Stake | b. Operator | b. Remove Manhole Lid | b. Jet Hose to Upstream MH | b. Attach Funnel Plug | b. Stop Funnel 6" into Pipe | | |
|---------------------|--------------------------------|--------------------|-------------|-----------------------|----------------------------|-----------------------|-----------------------------|--|--|

| | | | | | | | | | |
|-----------------------|---------------------------|--|--|--|-------------------|--------------------|------------------|--|--|
| c. ES-620 Field Guide | c. Connect Probe to Cable | | | | c. System Options | c. Attach to Probe | c. Turn on Water | | |
|-----------------------|---------------------------|--|--|--|-------------------|--------------------|------------------|--|--|

| | | | | | | | | | |
|------------------------------------|--|--|--|-------------------|--|-----------------------|-----------------------------|--|--|
| b. Turn on Electro Scan Controller | | | | d. Operator Login | | d. Sample Funnel Plug | d. Fill until over MH Bench | | |
|------------------------------------|--|--|--|-------------------|--|-----------------------|-----------------------------|--|--|

| | | | | | | | | | |
|--|--|--|--|-----------------|--|--|--|--|--|
| | | | | e. Sewer Agency | | | | | |
|--|--|--|--|-----------------|--|--|--|--|--|





Compliance EnviroSystems

COMPLIANCE ENVIROSYSTEMS

Contact
 Mr. Casey Smith
 Email: csmith@ces-sses.com

Compliance EnviroSystems, LLC
 1401 Seaboard Avenue
 Baton Rouge, LA 70810

Tel: 800-675-9409
 Website: www.ces-sses.com



DRS

DIAGNOSTIC RESOURCES & SOLUTIONS, LLC

Contact
 Ms. Danyale Berthleot
 Email: danyale@drsamerica.net

Diagnostic Resources & Services, LLC
 2840 Cressington Bend
 Kennesaw, GA 30144

Tel: 678-594-0731
 Website: www.drsamerica.net



Municipal Pipe Tool Co.

TRENCHLESS TECHNOLOGY CONTRACTORS

Contact
 Ms. Sharon Waschkat
 Email: sharonm@munipipe.com

Municipal Pipe Tool Co., LLC
 515 5th Street
 Hudson, IA 50643-0398

Tel: 800-798-4205
 Website: www.munipipe.com



MTech Company

Contact
 Mr. Dan Soukup
 Email: dsoukup@mtechcompany.com

The Safety Company, LLC dba
 MTech Company
 7401 First Place
 Bedford, OH 44146

Tel: 800-362-0240
 Website: www.mtechcompany.com

for Sewer & Stormwater

| ELECTRO SCANNING | | | | GEAR REMOVAL & CLEAN-UP | REPORTING | | |
|----------------------------------|---|--|--|--|---|---|--|
| 11. Position Probe | 12. Final Checks | 13. Key Indicators | 14. "Live" Scanning | 15. Completed Scan | 16. Gear Removal | 17. Clean-Up | 18. Cloud Reporting |
| | | | Electro Scan Finds Defects And Points of Infiltration That That CCTV Cannot. | | | | |
| a. Layout Probe | a. Connection Check | a. Water 'Too High' & Probe 'Too Slow' | a. Scan (In Process) | a. Raw Defect | a. Stop Retraction When Funnel in Downstream MH | a. Clean-Up Equipment b. Pack-Up Tools | a. www.CriticalSewers.com |
| | | 205.7 94.3 | | Shows Operator that scan is being recorded. Provides information on possible pipe defects. | | | |
| b. Insert Probe | b. Connection Check | b. Probe Speed 'Too Fast' | c. Save Scan | b. Total Defect | b. Carefully Pull Probe Into Downstream Manhole | | b. Data Display; Subject To Licensing |
| | | 205.7 94.3 | | Shows Operator that there is adequate current flowing through the probe to obtain an effective scan. This is important because the Raw Defect Current may show low values and very little variation (good pipe) and this is the only way the operator can be sure that the system is running properly. | | | |
| c. Single Pulley | c. Scan Setup | c. Total Current 'Too Low' | d. Successfully Added to Database | c. Water Height | c. Unhook Funnel Plug from Rope | | b. GPM for Advanced Data Management Only |
| | | 205.7 94.3 | | Shows Operator that the pipe is full at the probe location and that the pipe is not overfull. If the water height is too low then a scan of the complete pipe is not obtained. If the water height is too large there is a risk that houses will be flooded. | | | |
| d. Side Wedge Pulley OPTIONAL | 1. Total Current 2. Defect Current 3. Battery Volts 4. Probe Volts | d. All Readings 'Good' | e. Display Scan Data? | c. Data Integrity | d. Pull Probe & Rope Back Through Pipe | | Shows Operator that Probe is moving at a speed that enables the system to collect data every 10mm (0.394 inch). Plotted data represents distance (i.e. Data separation) between each defect current measurement. If the speed is too fast, the scan loses data fidelity (i.e. integrity) and will miss pipe defects. If the speed is too slow then too much time is taken to carry out the scan. |
| | | 205.7 94.3 | | | | | |




The Pipe Guys

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The Pipe Guys
10741 A Street South #A
Tacoma, WA 98444

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RUTT

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Website: www.ruffincompanies.com



Subtronic

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Tel: 925-686-3747
Website: www.subtronic.com



Electro Scan Services

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Website: www.electroscan.com

New Economy Magazine Names Electro Scan Best 'Water & Sewer CleanTech' Company

Continued from Page 1

Electro Scan's 2013 Clean Tech Award for Best Water and Wastewater Solutions was presented by The New Economy Magazine in ceremonies held at the London Stock Exchange on December 17, 2013.

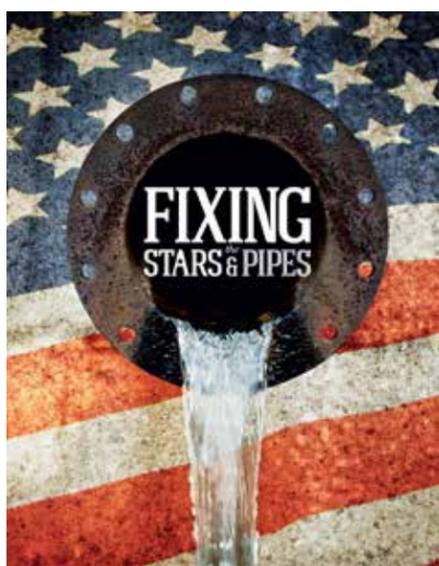
The New Economy is a quarterly magazine that captures the spirit of global thought leadership by promoting innovation, transparency and sustainability that reshapes the future.

Aimed at unearthing the new global clean tech elite, and the champions of tomorrow, awards were published in The New Economy's Winter 2014 Edition, representing one of the few periodicals authorized for distribution at the World Economic Forum held January 22-25, 2014 in Davos, Switzerland.

"We are delighted to announce Electro Scan as recipient of the 2013 Clean Tech Award for Best Water and Wastewater Solutions," states Jan Spiegel, Editor of The New Economy. "Disruptive technologies, like Electro Scan, that alter decisions, often represent the biggest breakthroughs in our economy."



Chuck Hansen, Chairman, Hansen Investment Holdings, LLC, principal investor for U.S.-based Electro Scan Inc., interviewed at the London Stock Exchange, December 17, 2013.



UK Young Engineer of the Year, Wessex Water's Liam MacFarlane, Selected for Electro Scan Project

Electro Scan Inc. was pleased to announce that Mr. Liam MacFarlane, Critical Sewers Engineer, Wessex Engineering and Construction Services (WECS), Wessex Water's in-house construction arm, was selected as the 'Young Engineer of the Year' award recipient, presented by the UK Society for Trenchless Technologies (UKSTT).

The award was based on Liam MacFarlane's technical paper 'Holistic Approach to Infiltration and Inflow Exclusion' highlighting an Electro Scan project.

The prestigious award was presented at UKSTT's 20th Annual Dinner & Awards Ceremony held in Birmingham, England in May 2014. The 'Young Engineer' award is presented to the engineer -- under 30 years of age -- who best demonstrates their contribution in the field of rehabilitation, the individual's contribution made, the quality of scholarly submission and the candidate's vision for the future of trenchless technology.

"I am proud to be selected for this distinguished award," states Liam MacFarlane. "I could not have achieved this honor without the help of the team at Wessex Water and Julian Britton, Rehabilitation Manager."

Liam MacFarlane joined Wessex Water in 2008 in the WECS trainee development programme, providing invaluable experience in all phases of project delivery, including: optioneering, design, construction, commissioning and handover. In

2010, Mr. MacFarlane was appointed Critical Sewers Engineer at Wessex Water, responsible for the project management and delivery of sewer renovation projects that specialize in trenchless installations. Mr. MacFarlane earned his Bachelor of Science (BSc) degree in Civil Engineering from the University of the West of England in 2013.

"My involvement with Electro Scan started in 2013 with several kilometers of surveys in the Southwest of England," stated Liam MacFarlane. "We robustly trialed the Electro Scan technology identifying improvements to the hardware and working closely with Electro Scan's onsite team."

"Electro Scan was very successful in Mark, Somerset, England where forty-three (43) sewers were identified as the most critical assets with a cumulative infiltration rate of 12 litres per second (l/s) or 1000m³ per day, costing the company over £120,000 (\$180,000) per annum in operational expenditure," continued Liam MacFarlane.

"With the UK's Environmental Agency expectation to have every £1 cost of flood defense expenditure deliver £8 of benefit, all capital expenditures must bring the best value," stated MacFarlane. "As seen in our Somerset trials during the recent winter flooding, we were able to document the comparative cost/benefit analysis. Prior to using Electro Scan we didn't have the analytical tools to effectively use epoxy sealed CIPP, as CCTV surveys

were inconclusive. With Electro Scan, I can now demonstrate to my clients a conservative cost/benefit of at least £10-15; especially in geological areas where groundwater-induced hydraulic lithology threatens the stability of adjacent buildings."

"We are honored to be a small part in Liam MacFarlane's success," commented Chuck Hansen, Chairman, Electro Scan. "We look forward to watching Mr. MacFarlane's leadership in using technology to accelerate the pace of change in the field of civil engineering."

During the last seven years, Wessex Water Services Limited has seen four of its engineers win the UKSTT's prestigious Young Engineer award. In addition to Liam MacFarlane's selection this year, previous Wessex Water award recipients included Alex Aulds (2012), Leanne Ford (2010), and James Kitching (2008).



Liam MacFarlane, 2014 winner of "Young Engineer of the Year," presented by the UK Society of Trenchless Technology.

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RO-KA-TECH

Internationale Fachmesse für Rohr-, Kanal- und Industrieservice

06.05.2015-08.05.2015, Kassel, Germany

Top Sewer Contractor From Japan Visits Sacramento To Meet Electro Scan Leaders

Word of global adoption of Electro Scan, and leading substitution for legacy condition assessment techniques, such as CCTV, pressure testing, and smoke & dye flood testing, is growing.

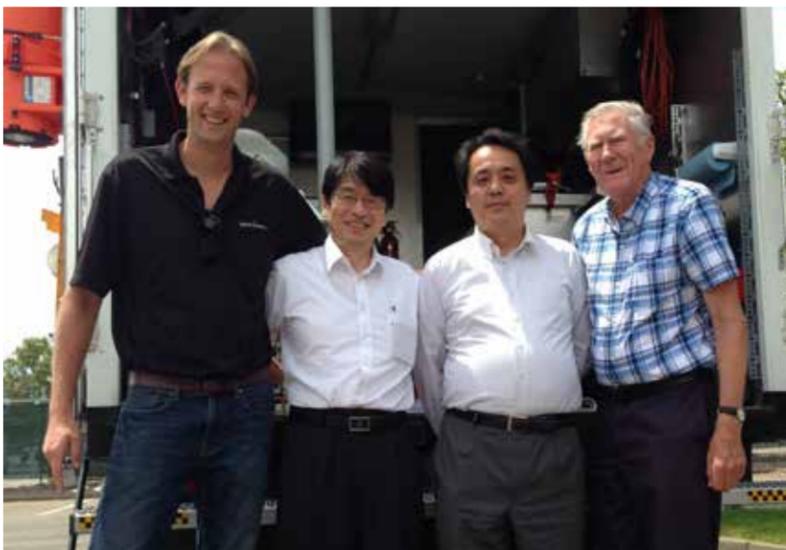
After numerous trials throughout Japan, including joint participation at national trade exhibitions, seminars, and customer workshops, members of KANTOOL Co. Ltd. (Tokyo, Japan) and KANSEI Co. (Yokohama, Japan), visited the Sacramento, California headquarters of Electro Scan for a series of planning meetings and business discussions, including an all-day series of pre- and post-rehabilitation pipes in Vallejo, CA.

Electro Scan's senior management was delighted to welcome Mikio Goto, Kiyoo Hosaka, and Katsutoshi Shigemitsu from KANTOOL and Atsushi Takada, Department Manager, Industrial Technology from KANSEI.

"KANTOOL provided us with such a warm reception and spirit of teamwork during our visits to Japan," stated Chuck Hansen, Chairman of Electro Scan. "I hope that we returned the favor during their visit to California."

"Japan's population density presents a number of unique challenges," says Mark Grabowski, VP Electro Scan. "It's great to see their innovative solutions and how Electro Scan can easily address their pre- and post-CIPP assessment needs."

A special thanks to Kenneth Kerri, from the Office of Water at California State University, Sacramento, for participating in discussions in Sacramento.



From Left to Right: Mark Grabowski, VP Electro Scan, Mikio Goto and Katsutoshi Shigemitsu, Sales Managers, Kantool Ltd. Co., and Kenneth Kerri, Chief Project Consultant, Office of Water Programs, California State University, Sacramento.

Vallejo Sanitation and Flood Control District Hosts International Visitors

Electro Scan thanks Managers, Supervisors, and Operators for hosting a day-long Electro Scan demonstration attended by leading experts from Tokyo and Yokohama, Japan.

Visiting dignitaries were given a first-hand look at the operating procedures and field production rates for surveying pre- and post-rehabilitated pipes.

Three pipes were surveyed, including Vitrified Clay Pipe, PVC, and

CIPP lined pipe, with comparison to existing CCTV reports.

Special thanks to Melissa Morton, Andy Jannings, and Jay Frazelle from VSFCO and Thomas Johnson from WECO Industries, Electro Scan's authorized dealer in Northern California.

Street Address
450 Ryder Street
Vallejo, California 94950
Tel: 707-644-8949

PROFILE:
Vallejo (Calif.)
Sanitation and Flood Control District

FOUNDED:
1952

POPULATION SERVED:
120,000

AREA SERVED:
26 square miles

WASTEWATER FLOW:
9.3 mgd average dry weather

EMPLOYEES:
85

INFRASTRUCTURE:
413 miles of sewer; 10,715 manholes; 28 lift stations

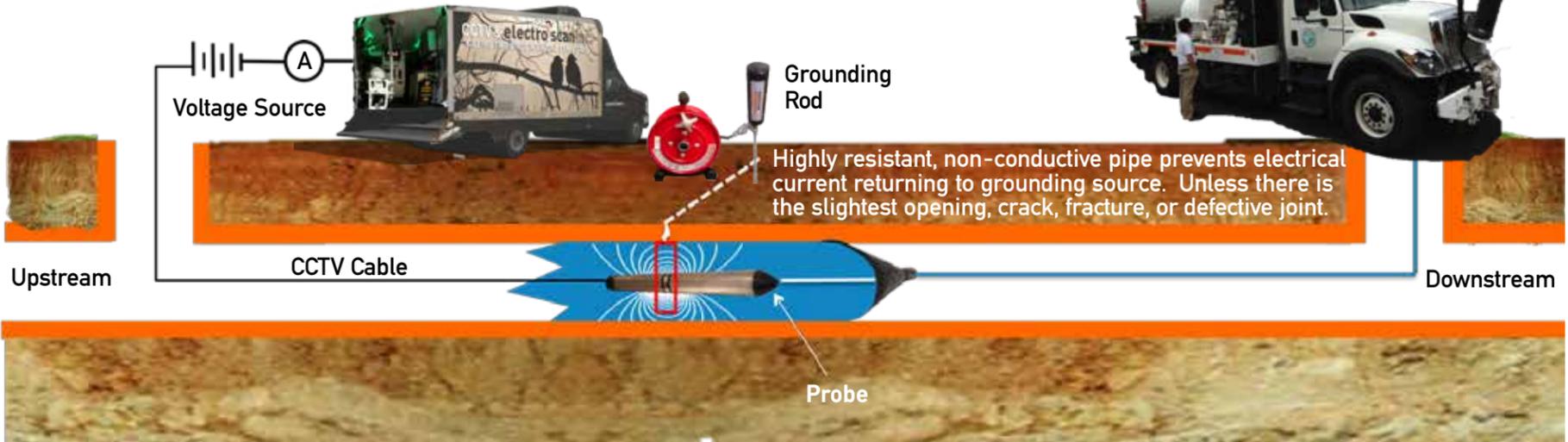
ANNUAL BUDGET:
\$27 million

WEB SITE:
www.vsfcd.com

Source: Municipal Sewer & Water Magazine, July 2010



VSFCO Field Maintenance Building, Vallejo, California.



Electro Scan & Grout: A Winning Combination in O'Fallon, MO

The City of O'Fallon MO, one of St. Louis' largest suburbs, prides itself on its proactive approach to pipe rehabilitation.

Located just 15 minutes west of Lambert Field/St. Louis International Airport and encompassing 29.69 square miles, the City of O'Fallon is home to both MasterCard's Global Technology Center and SAK Construction, LLC.

Utilizing its in-house crews to operate their CCTV inspection truck, in addition to their own Test and Seal Chemical Grouting truck, their dexterity allows them to address *small issues* before they become *large problems*.

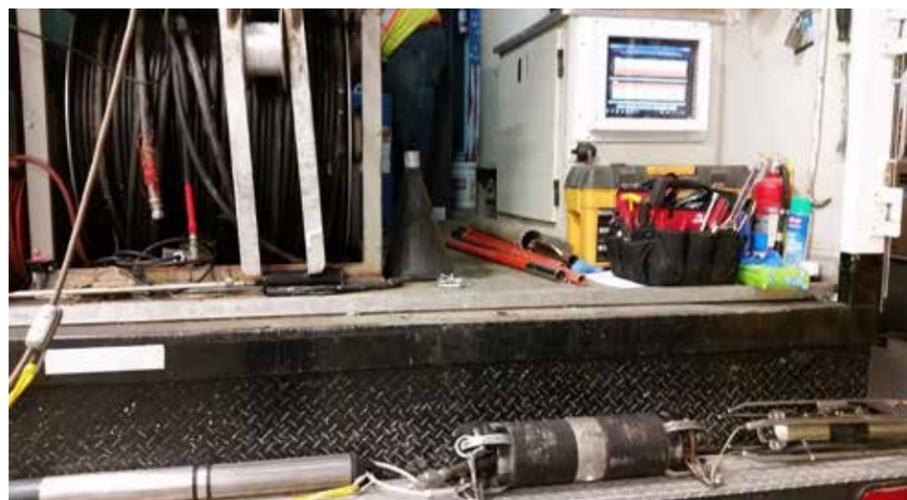
Like many agencies around the globe, they've found that Electro Scan gives them the ability to better prioritize their rehab and help determine the best method to rehabilitate sewers.

That's why, in January 2014, the City of O'Fallon went out to bid for an ES-620 system, which was ultimately supplied by EJ Equipment (Manteno, IL).

Installed on their Grout Truck, the City of O'Fallon now uses Electro Scan to help rapidly decipher between pipes worth grouting, lining, or simply to be left alone; all in about 1/10 of the time it would have taken a traditional packer to complete joint pressure testing the same sewer main.

Certainly, faster production means that *small issues* never become *large problems!*

| City of O'Fallon, MO Infrastructure Profile | |
|---|--------|
| Population | 80,000 |
| Sewer Main (Miles) | 195 |
| WWTP Capacity (MGD) | 11.25 |



(Above) Electro Scan's installation on the City of O'Fallon's existing CCTV and Grouting truck.

Leading Trenchless Supplier, LMK, Conducts Electro Scan Test

"It's better for lining companies to make sure their product is watertight, first, instead of having the Owner find out for themselves, after the job is completed, that it's not."

Pete Dannenberg, Field Operations Supervisor



June 2014 (Above) Pete Dannenberg, formerly with LMK, pictured on-site at LMK's headquarters in Ottawa, IL where Electro Scan technology was used to test LMK's proprietary hydrostatic test tanks.



July 2012 (Above) Andrew O'Keefe demonstrates ES-38 with LMK and EJ Equipment staff.

Singapore International Water Week Features Electro Scan Investor, Chuck Hansen, as Keynote



June 1, 2014 (Singapore) - Chuck Hansen, Chairman of Hansen Investment Holdings, LLC, and principal investor of Electro Scan Inc., wearing one of his distinctive Hawaiian shirts, addressed delegates at TechX-change to discuss his experience in deploying high technology products and services to the global water business.

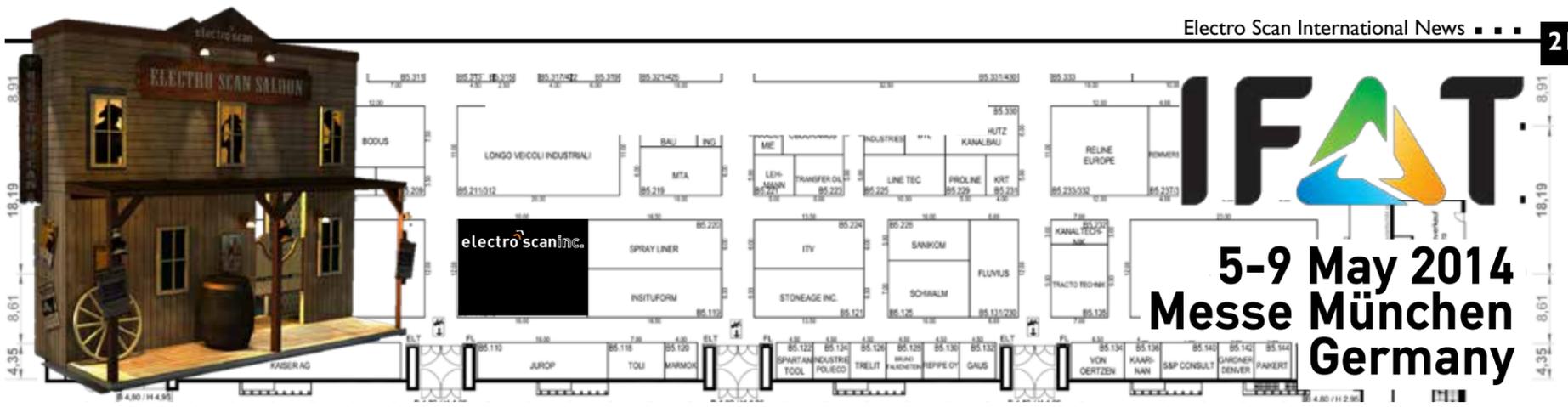
Also, as an investor in several start-ups, Chuck participated as a judge/panelist, evaluating new company presentations.

Similar to America's Shark Tank and Great Britain's Dragon Den, distinguished panelists asked questions after company CEOs presented 7-minute snapshots of their company's solutions.



(Above) ELECTRO SCAN INC., and HANSEN HOLDINGS, LLC, Chairman, Chuck Hansen gives keynote address entitled "Addressing the Challenges of Technology Commercialisation in International Water-Tech Markets" at Singapore Water TechXchange. (Below-Right) Chuck Hansen participates on a Dragon's Den Panel with Steve Kloos, Partner, TRUE NORTH VENTURE PARTNERS, USA and Véronique Hervouet, Senior VP, TOTAL ENERGY VENTURES, FRANCE.





Electro Scan Attracts Record Crowds

... and Lots of German Beer Consumption!



May 5-9, 2014-München, Gernmy. Electro Scan attended its first IFAT Exposition taking the largest booth of any American company and attracting record crowds. During the exhibition, Electro Scan showed off its recently activated EU Demonstration Van, fresh from a tour through France, Belgium, The Netherlands, and Germany, where it also conducted a major benchmark for a leading European lining company.



North American Society for Trenchless Technologies Names Electro Scan 'Best Innovative Product' of 2013

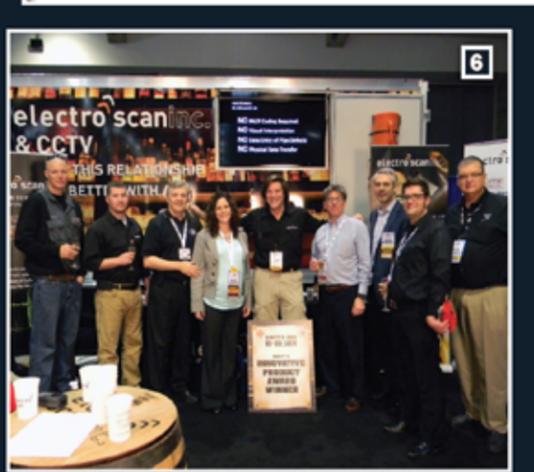
INNOVATIVE PRODUCT AWARDS

NASTT annually recognizes two companies with state-of-the-art products in either new installation or rehabilitation for their achievements in advancing the trenchless industry — called the Joseph L. Abbott Jr. Innovative Product Awards. This year, Electro Scan Inc. and HammerHead Trenchless Equipment were the recipients of this honor.

The award is given in memory of the late Joseph L. Abbott Jr., who was an active member of the society since its inception in 1990. Electro Scan Inc. and HammerHead were formally recognized at the Gala Dinner.

Electro Scan Inc. received the Rehabilitation Award for its Electro Scan ES-620 for Sewer Mains technology. Using patent pending technology that measures the variation of electrical current inside pipes, electro scanning is now available to independently test and certify newly relined

and rehabilitated sewer mains and laterals as leak free. While CCTV inspection is often conducted when a pipe is dry, Electro Scan assesses a pipe's performance under wet conditions. Electro Scan is designed to more accurately find defects in newly relined pipes.



Electro Scan Releases Specification For Standalone Mobile Inspection Van

As more sewer & water utilities, service contractors, and professional engineers, become more familiar with the data accuracy, precision, and productivity improvements over legacy CCTV camera inspection, many are issuing specifications and tenders for stand-alone Electro Scan survey vans.

The mobile inspection van is different than Electro Scan's usual demo trucks or vans used for pilot projects and demonstrations, as in they don't feature a double kegerator used to support a busy exhibition schedule, among other custom features.

Stand-alone Electro Scan mobile inspection vans, available directly

from Electro Scan Inc. are outfitted with modern mobile command centers including: customer defined cable and reel infrastructure, rear-mounted operator consoles, and wifi connectivity. From any Electro Scan Van, anywhere on the globe, results are automatically transmitted to the company's award-winning Critical Sewers® or Critical Water® cloud application.

Contact Mark Grabowski, Electro Scan, Vice President, at mark@electroscan.com to request a copy of our standard specification and customer options.



Mark's Corner

Simulating Wet-Weather Conditions With Funnel Cones, Kites, Parachutes & Plugs

Electro Scan Adopts O&M Tools from the 1960s to Temporarily Surround Its Tethered Probe with Water

A key advantage of the Electro Scan technology – and the reason that its not “if” but “when” you will be getting it added to your TV truck – is its ability to assess sewer and stormwater pipes by simulating wet weather conditions. Since we typically CCTV in dry weather periods, i.e. when flow is the lowest, Electro Scan is the first tool that automatically tests a main for defects, not able to be seen by CCTV cameras.

When scanning water mains, the pipe is already full and in pressurized conditions. But, how do we temporarily simulate wet-weather conditions, without inadvertently flooding a customer's lateral?

Easy; by using the right funnel cone, kite, parachute, or plug as field conditions warrant. Sewer operators have been blocking, plugging, and dragging things through sewers and storm drains for centuries. But, with Electro Scan, we only need to surround the middle of our probe with water, so

why not create a moving reservoir that surrounds our probe as its pulled through the pipe? Since our probe is traveling at the rate of 45-60ft a minute, the average scan will only take 5-10 minutes.

While blocking the sewer main at the downstream invert is a last resort to fill up the pipe, see how our funnel cones and kites can make this simple and straightforward to surround our probe, allowing our low voltage, high frequency electric current, use water to conduct to the wall of the pipe.

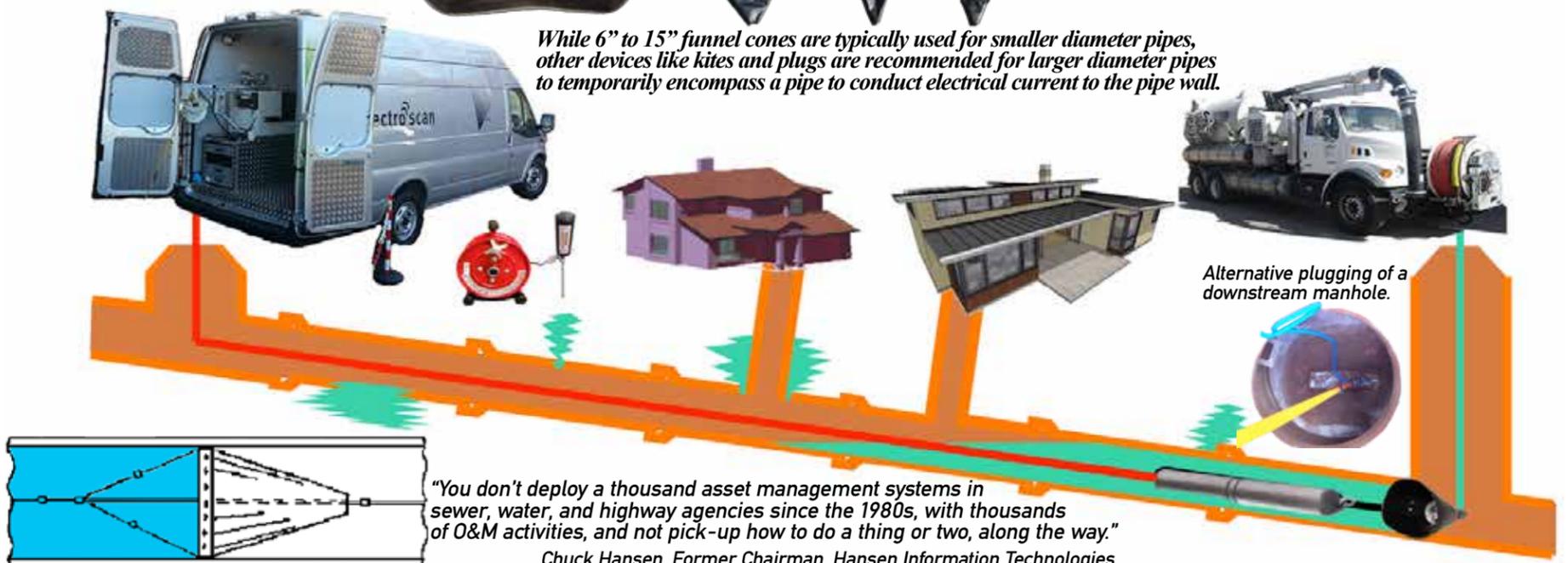
While CCTV camera still have their place in pipe asset inspection, we all know that finding leaks in sewer systems is outside the wheelhouse of visual-inspection technologies. Call or email me at mark@electroscan.com if you have any questions.

Assorted Cones, Kites, Parachutes & Plugs



Mark Grabowski, Vice President Electro Scan.

While 6" to 15" funnel cones are typically used for smaller diameter pipes, other devices like kites and plugs are recommended for larger diameter pipes to temporarily encompass a pipe to conduct electrical current to the pipe wall.



"You don't deploy a thousand asset management systems in sewer, water, and highway agencies since the 1980s, with thousands of O&M activities, and not pick-up how to do a thing or two, along the way."
 Chuck Hansen, Former Chairman, Hansen Information Technologies

Mapping the Re-Structuring of the Pipe Condition Assessment Market

“Disruptive technologies don’t conquer their markets until they redefine their marketplace. When that happens, mastery of that new paradigm redefines industry leadership overnight.”

Laura Shenkar
The Artemis Project



Building His Next \$100 Million Tech Business

Just as Apple Computers hastened the demise of music CDs and Netflix has changed the landscape for renting movies, Electro Scan has begun the rapid re-structuring of the pipe condition assessment market.

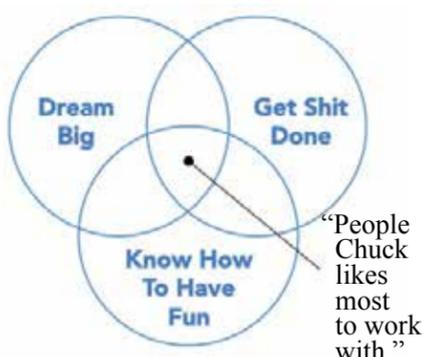
Well on his way to building his next \$100 million tech business -- after selling his first one (Hansen Information Technologies) for \$100 million -- Chuck Hansen is reshaping how existing pipes are assessed and new CIPP lined pipes are accepted by their owners.

Impacting some of his old stomping grounds, namely asset management, geographic information systems, hydraulic models, and legacy sewer system evaluations surveys (SSES), big changes are already under way.

“Electro Scan is causing a tectonic shift [i.e. having a strong and widespread impact],” says Chuck Hansen. “Billions have been spent to create systems that currently store (asset management) and display (GIS) coverages that are either outdated, inaccurately cataloged, or simply wrong.”

“To effectively & efficiently prioritize assets that need rehabilitation and how projects are certified for acceptance, software code must be re-written to portray a whole new data set,” says industry veteran, Chuck Hansen.

“The millennium bug--that caused full-time employment for IT professionals to change



Chuck Hansen, Entrepreneur and Chief Experience Officer.



New technology from Electro Scan Inc., that does not rely on visual observations and is easier & faster to operate, is displacing legacy pipe condition assessment systems. By finding defects missed by others or incorrectly cataloged, Electro Scan can save billions by selecting the right pipes to fix. And, once repaired, will last.

basic computer programs from 1999 to 2000--was nothing compared to the massive re-write facing asset management developers, hydraulic modelers, and GIS professionals, that have to retire legacy inspection technologies. The good news: there is a whole new library of software tools, pre-packaged code, and pre-baked solutions that can plug & play to update application code & servers,” says Chuck.

“With any new technology, you will have people that lag behind the rest of the field -- either they are too entrenched in the old way of doing things or just not comfortable in leading others. Not to worry, as they usually stick out like a sore thumb.”

Wanted: Field Techs & Evangelists

Bringing disruptive products to any market is not for everyone. Often resembling a cage fight in Mad Max or the Hunger Games, where two people go in and one comes out, innovators and their evangelists will never be popular with legacy product providers. No one wants to have their weaknesses pointed out in their existing

product, let alone show their biggest customers that they often provide the wrong answer.

But, the takedown of giants is fun.

“Tech moves fast,” says Chuck Hansen, “and that’s why legacy suppliers and technology providers, using the same solutions for the past 10 years (or more), are having a difficult time competing and growing.”

Given our success in the wastewater collection business and new entry in the water distribution business, Electro Scan is looking for the next generation of staff that is able to rapidly build, deploy, and extend its reach.

Interested?

Email our CEO directly at chuck@electroscan.com to find out if your talents would be useful in helping us build a suite of new products to serve the next generation community of pipe condition assessment professionals.



Adding Electro Scan To Your Utility Is Easy.

Follow Electro Scan's Next Gen Technology On Social Media



Next Generation Sewer & Water Pipe Condition Assessment

Legacy Sewer Inspection Techniques Step-Aside for New Precision-based Leak Detection Technology

A major shake-up has begun in the pipe condition assessment market causing reverberations throughout the industry, including legacy suppliers, manufacturers, lining contractors, and asset management system vendors.

How Does Electro Scan Work?

Most sewers are made of non-conductive materials, such as asbestos concrete,

brick, clay, cement, plastic, reinforced concrete, liners, etc., so Electro Scan's low voltage, high frequency current should not be able to 'leak' out of a pipe, unless there is a defect in the pipe wall.

"If a pipe has no cracks, broken joints, or defective service connections, not typically seen by high resolution CCTV cameras, there will be no electrical reading as it attempts to

Electro Scan May Record From 12,000 To 20,000 Data Points, In Less Than 10 Minutes, For An Average 300 Foot, 8 Inch Diameter Sewer

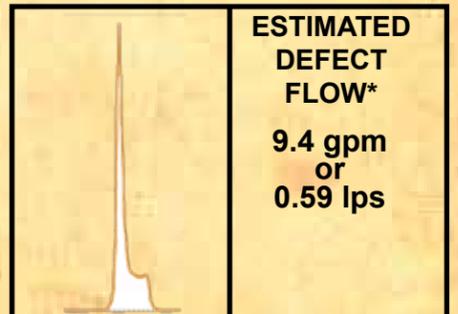
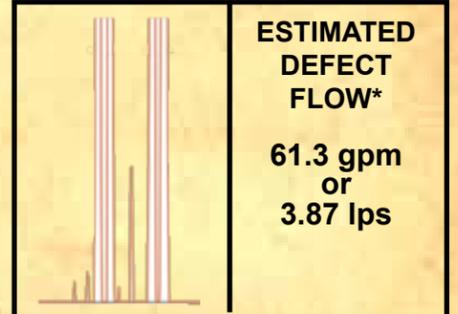
close its circuit and return to its grounding source. But, if there is the slightest opening, fracture, or crack, Electro Scan's international patent-pending technology will register the Start, End, and Defect Current Height to precisely measure its location and estimated defect flow, often generating from 12,000 to 20,000 data points," states Chuck Hansen, Chairman, Electro Scan Inc.



Not Seen By CCTV or Heard By Acoustics

CCTV | Kanalinspektion | 闭路电视

ELECTRO SCAN



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*GPM and LPS calculation assumes a 1ft water head and 1% pipe gradient with ±40% accuracy.

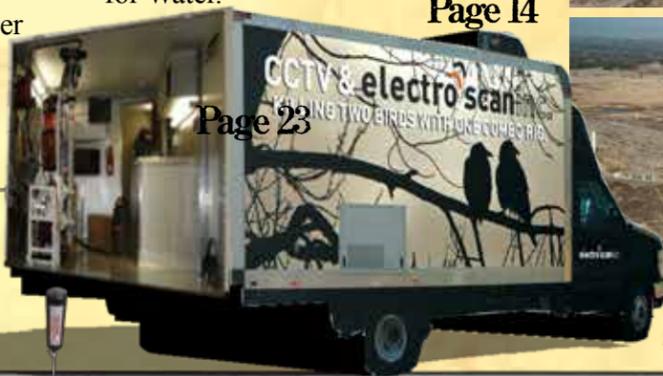
Acoustic Surveys That 'Listen' for Water Leaks Are Becoming a Thing of the Past

Record drought, declining groundwater levels, and global warming are causing major sources of drinking water to disappear at a rapid pace. Yet, many water utilities continue to experience additional water losses with leakage rates ranging from 15-50% of their available supply.

members to forget about using percentages to describe its water losses; instead, to calculate volumes of water losses and the financial cost of loss reduction strategies. While you can't *manage* what you can't *measure*, you also can't *measure* what you can't *find*. But, now there is Electro Scan for Water."

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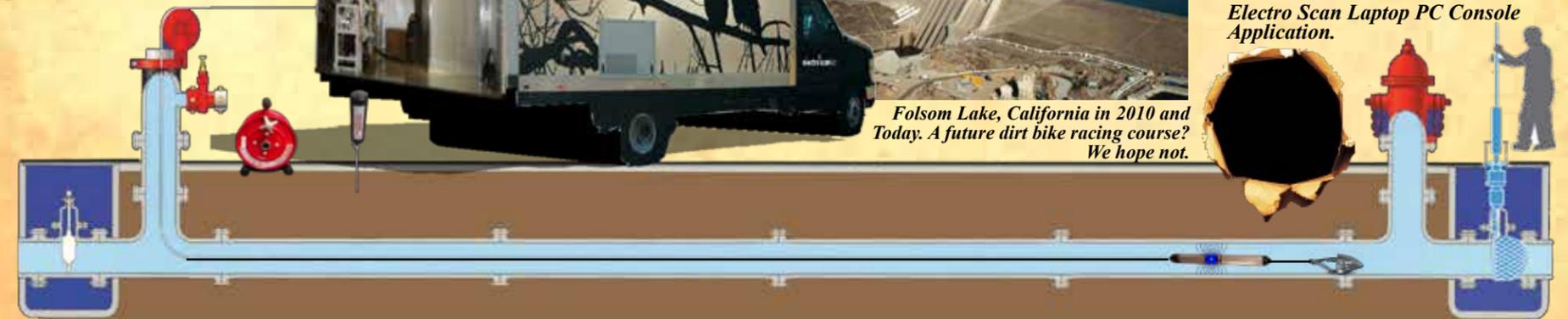
"It may be time to take a closer look at AWWA M36," says Chuck Hansen, former asset management supplier and member of AWWA. "It was good for AWWA to tell its



Folsom Lake, California in 2010 and Today. A future dirt bike racing course? We hope not.



Electro Scan Laptop PC Console Application.



He's At It Again! Find Out How Chuck Hansen Is Overhauling the Pipeline Assessment Market

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electro scan inc.
Change Service Requested
1745 Markston Road
Sacramento, CA 95825-4026

www.electroscan.com