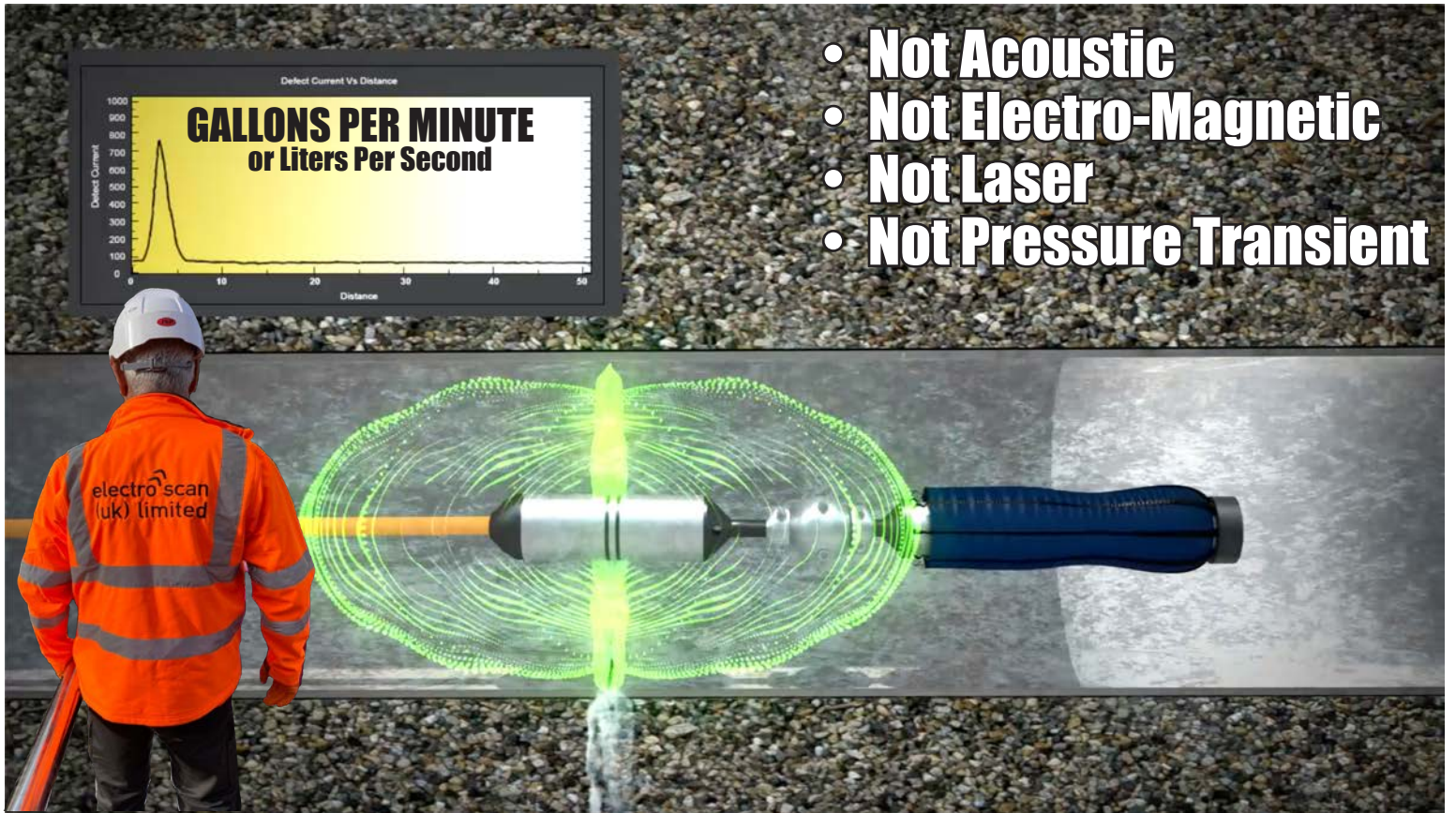
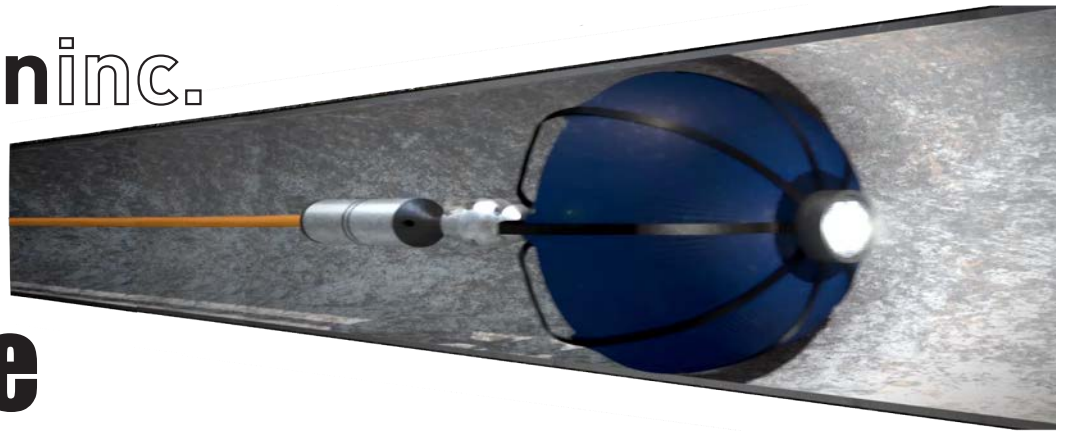


electro^oscaninc.

NEW #1

Worldwide

Leak Detection Tool



- Not Acoustic
- Not Electro-Magnetic
- Not Laser
- Not Pressure Transient

UK PROJECT

ELECTRO SCAN	Single Pass Survey	# Leaks 15
ACOUSTIC SENSORS	Multiple Attempts	0

Pipe Length - 560 ft (170m) | Diameter - 24-inch (600mm) | Status - New Pipe
Material - Cement Mortar Lined Ductile Iron Pipe | Pressure - 130.5 psi (9 bar)

COMPETITION

19 November 2020

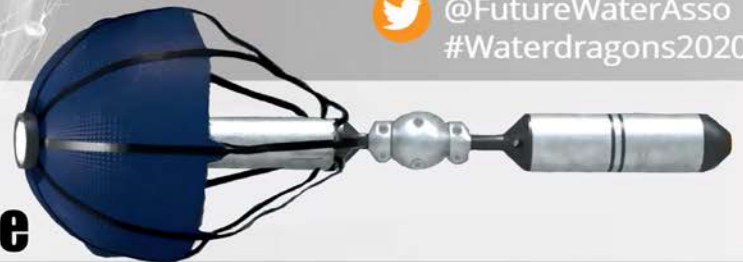
Winner



@FutureWaterAsso
#Waterdragons2020



ELECTRO SCAN INC.
**Multi-Sensor
Water Leak
Detection Probe**



Chuck Hansen

Software Entrepreneur &
Chairman, Electro Scan Inc.

CCTV



ACOUSTIC



CONDUCTIVITY



Competitive Advantages

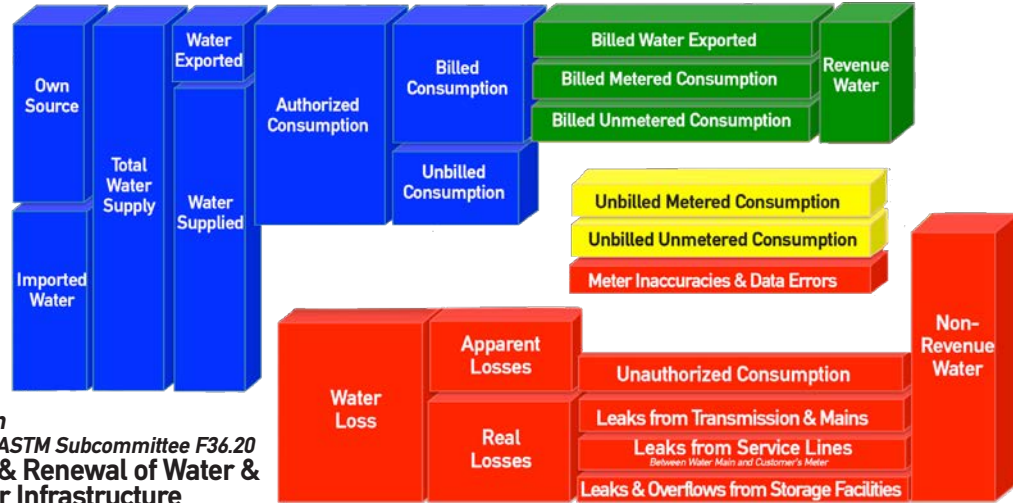
- **No Lost Balls or Spheres. We're Tethered.**
- **No False-Positives from Hitting Pipe Wall. Ohms Law.**
- **No Missed Leaks. We find them all.**
- **No Guessing 'Which Leak is Larger?' Each Has a GPM.**
- **No High Pressure Needed. We're Pressure-Independent.**
- **No Long Wait for Reports. Data is Available in Minutes!**
- **No Multiple Tests. 1/2in (1cm) Locational Accuracy.**

Did You Know...

Legacy Leak Detection Methods Can't Measure Leaks in LPS or GPM?



Chuck Hansen
Former Chair ASTM Subcommittee F36.20
Inspection & Renewal of Water & Wastewater Infrastructure



COMMON LIMITATIONS: NO QUANTIFICATION. LOW ACCURACY. POOR OR NO REPEATABILITY OF RESULTS.

- Acoustic Sensors
- Aerial Photogrammetry
- CCTV & AI/ML-CCTV
- Correlators & Data Loggers
- Drones
- Electro-Magnetic (EM)
- Fiber Optics
- Ground Penetrating Radar (GPR)
- Helium Tracers
- Infrared & Thermal Imaging
- Lasers
- LiDAR
- Satellite
- Smart Leakage Balls & Spheres
- Sonar
- Transient Pressure Testing

Acoustic Data Loggers, Hydrophones 	Acoustic + CCTV 	Helium Gas Tracer 	Untethered Acoustic 	Sahara Leak Detection 	Electro-Magnetic 	Transient Pressure 	Magnetic Flux 	FitBit Sensors 	LiDAR LIGHT DETECTION AND RANGING 	Self-Fixing Leak Detection 	Low Flying Aerials 	Low Elevation Drone 	Satellite
Dye Testing 	Smoke Testing 	CCTV Inspection 	Zoom CCTV Cameras 	Laser Profiling 	Acoustic Sensors 	Sonar 	Laser + Sonar 	Multi-Sensor 	Video Micrometer 	Infrared Thermograph 	Ground Penetrating Radar 	Wall Thickness Testing 	Fiber Optics

New Tech Sought After Water Leaks Not Found By Sight, Smell, Sound



SEE LEAKS? No!

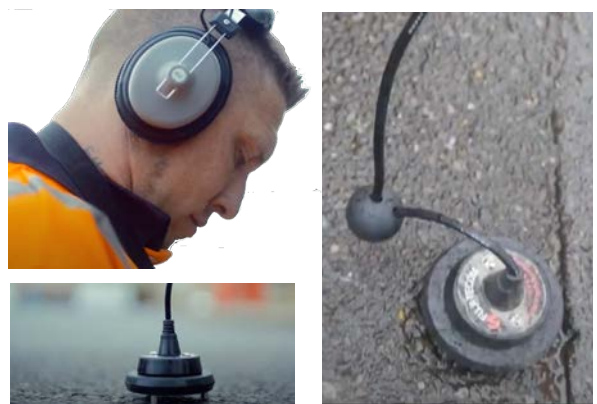


SMELL LEAKS? No!

A technician in blue overalls and an orange shirt is using a helium leak detector on a pipe. The detector is connected to the pipe and has a small display. To the right of the technician is a cluster of colorful balloons (red, blue, yellow, green, purple) and a yellow card with the chemical symbol ${}^2\text{He}$ and the name Helium with atomic mass 4.0026.

${}^2\text{He}$	← ATOMIC NUMBER - number of electrons - number of protons
${}^2\text{He}$	← SYMBOL / NAME
4.00	← ATOMIC MASS - in AMU (atomic mass units)

HEAR LEAKS? No!



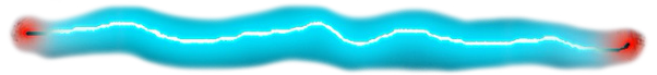
Reliance on Hearing a Leak



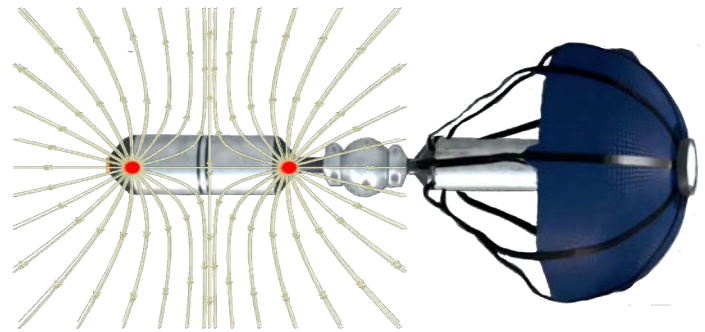
OLD WAY

Measuring The Size of a Hole

NEW WAY



Ohms Law + Orifice Equation

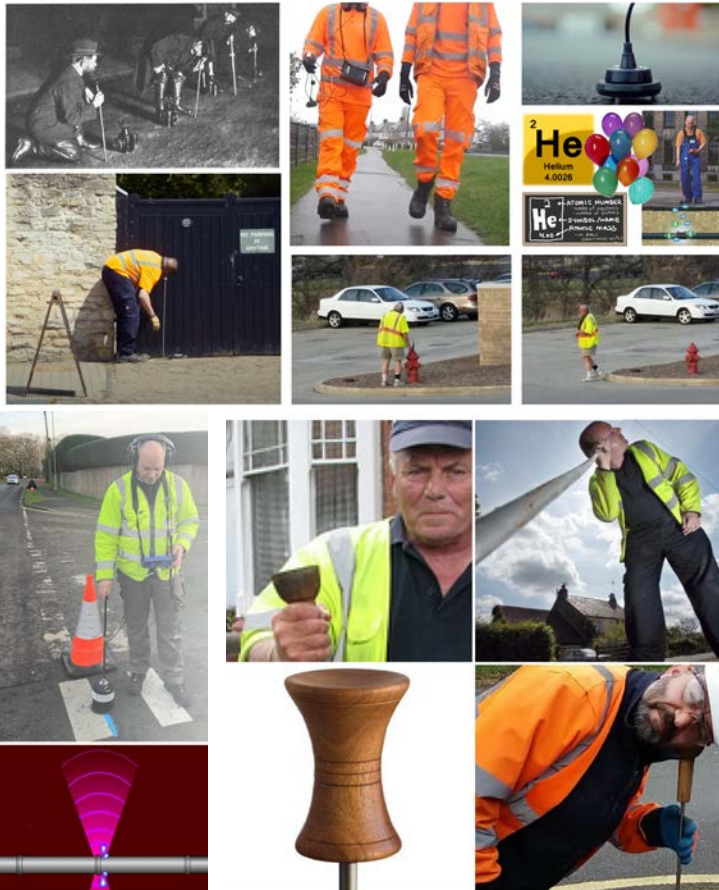


1cm Accuracy and LPS

Distributed Cracks



Localized Cracks



**Unambiguous
Unbiased
Unprecedented**

A NEW WAY

Electro Scan's Patented
Low Voltage Electric Current



electro^oscaninc.

Machine-Intelligent Leak Detection Technology

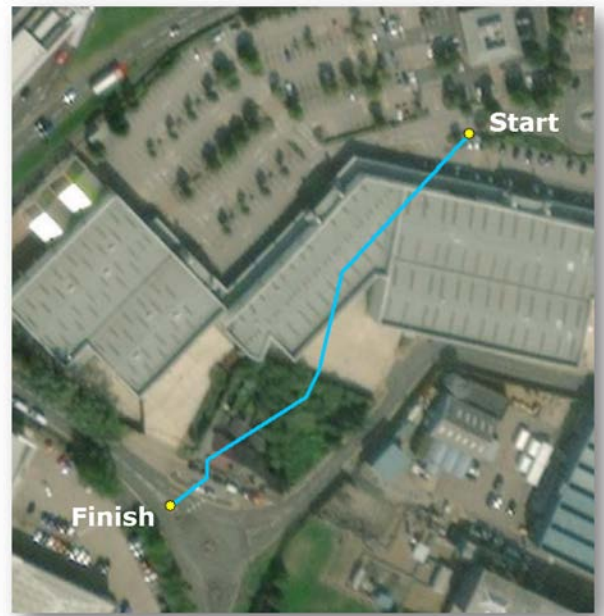
76-1500mm (3-60 inches) Diameter Pipes

The Switch is 'ON'

Not to be confused with Electro-Magnetic (EM), where vendors CAT-Scan pipe walls and never find a leak.

UK CASE STUDY

1. Multiple Hydrostatic Tests **FAILED**
2. **NO LEAKS RECORDED** by Previous Tests
 - a. Acoustic Hydrophone
 - b. Data Loggers & Helium Tracer
 - c. In-Pipe Tethered Acoustic Sensor
3. Pressures are Erratic
4. Flow is Turbulent
5. Noisy Construction Site



Pipe Length - 560 ft (170m) | Diameter - 24-inch (600mm) | Status - New Pipe
Material - Cement Mortar Lined Ductile Iron Pipe | Pressure - 130.5 psi (9 bar)

ELECTRO SCAN TEAM

Over 3,000 Combined Pressure Pipe Insertions



ELECTRO SCAN	Single Pass Survey.....	15
ACOUSTIC SENSORS	Multiple Attempts.....	0

Leaks



Multi-Sensor Delta Probe for Pressurized Water Mains

DEFECTS

Defect Type	Count	Defect Length (%)	Defect Flow (%)
Large	2	0.00%	0.00%
Medium	0	0.00%	0.00%
Small	13	2.00%	2.00%
Periodic	0	0.00%	0.00%
All Defects	15	2.00%	2.00%

DEFECT CURRENT

A CONDUCTIVITY

Data

Defects	Length (ft)	GPM	% of GPM	GPD
15	1,119	38,050	100%	54,792
66.63	66.63	0.00	0.70	1,008
116.10	116.19	0.08	2.41	3,470
132.56	132.72	0.16	3.56	5,126
196.54	196.54	0.00	0.11	158
258.14	258.14	0.00	0.11	158
302.76	302.76	0.16	5.77	8,309
334.22	334.22	0.00	0.05	72
364.01	364.01	0.00	0.15	216
402.40	402.64	0.24	5.68	8,179
457.83	457.91	0.08	3.76	5,414
474.80	474.81	0.00	6.16	8,870

NOTE: NOISE FROM HITTING PIPE WALL WITH SENSOR. NOT VALID LEAKS.

B ACOUSTIC






NOTE: ANGULAR ROCK IN JOINT

C CCTV

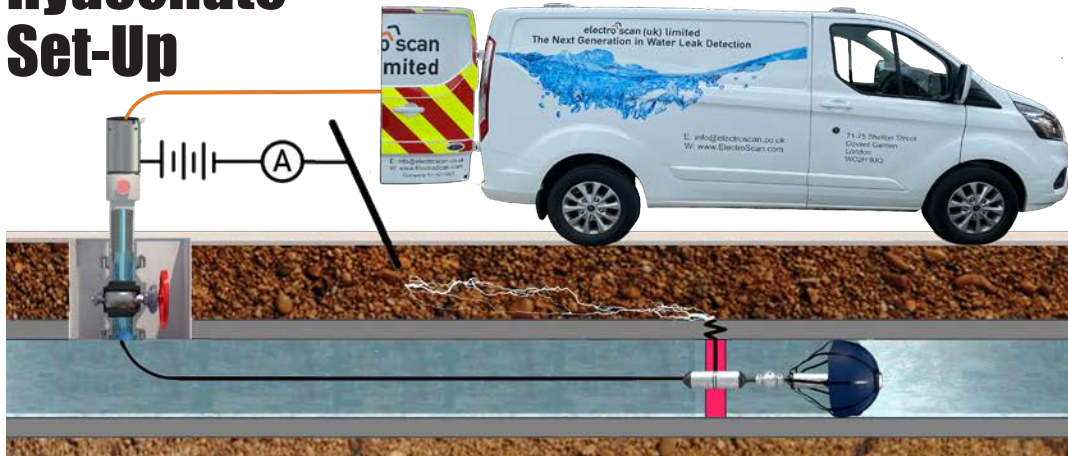
144.6m

PRODUCT COMPARISON

Real Leaks ← **Points of Interest** →
 May or May Not Reflect an Exact Location of a Leak.

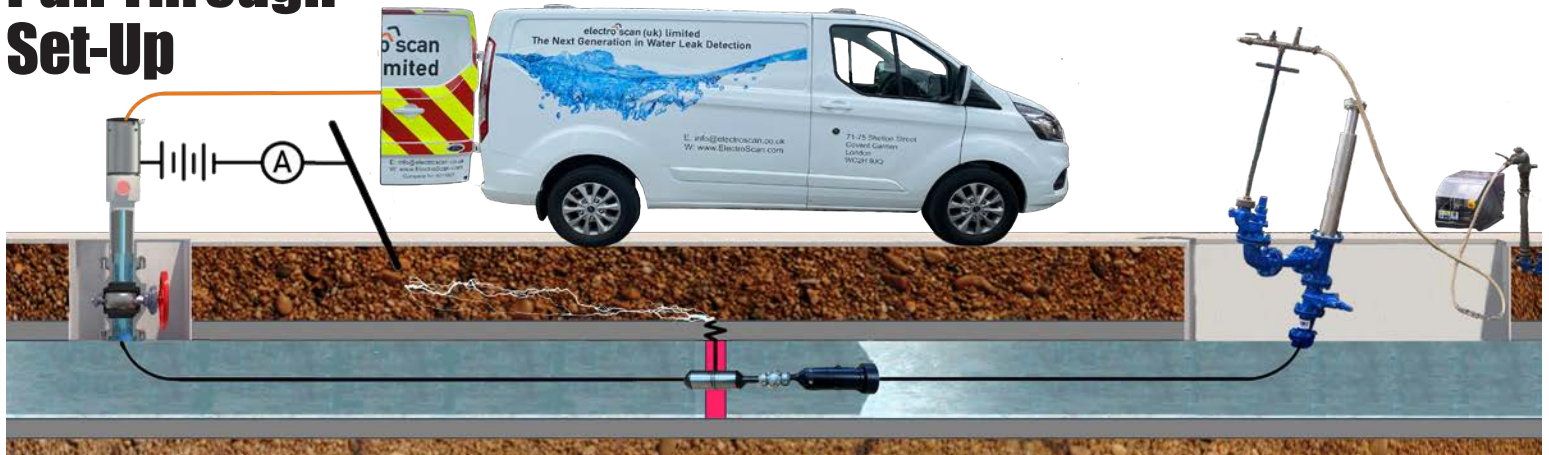
Company	electro scan inc.	Aquam	Xylem/WRC Formerly Pure Technologies		Aganova	Utilis
Features / Product	Delta	JD7	Sahara	SmartBall®	Nautilus	Satellite
Technology	Electric Conductivity	Acoustic	Acoustic	Acoustic	Acoustic	Synthetic Aperture Radar
① In-Pipe Connection	Tethered	Tethered	Tethered	Free Flowing	Free Flowing	<input type="checkbox"/>
② Acoustic						<input type="checkbox"/>
③ Water Pipes (AWWA M77)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
④ Closed-Circuit Television (CCTV)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
⑤ Identifies Joint Leaks	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
⑥ Identifies Customer Tap Leaks	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
⑦ Identifies Pipe Wall Leaks	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
⑧ Sewer Pipes (ASTM F2550)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
⑨ Locational Accuracy 1 cm	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
⑩ Each Leak in LPS or GPM	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
⑪ SaaS Cloud Reporting 10min	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
⑫ Innovyze® API	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Hydochute Set-Up



Both Set-Ups
 +3,000 feet
 Per Scan

Pull Through Set-Up



QUESTION #1

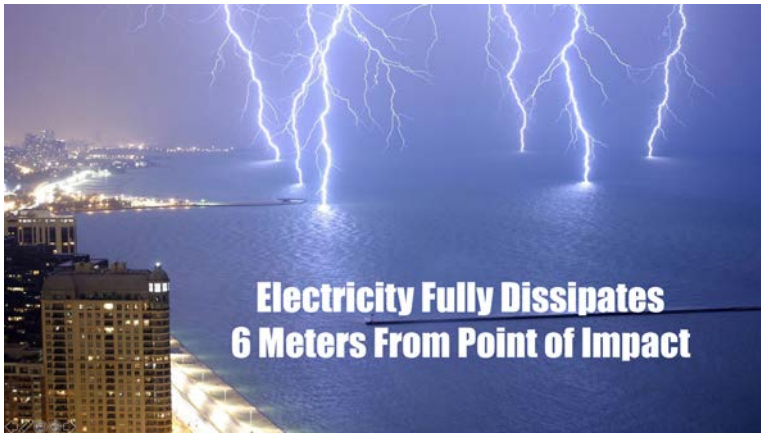


“Given Electro Scan Uses Water as a Conductor, Can Electric Current Travel Up a Customer’s Pipe and Get False Readings?”

— Steve Quarmby, United Utilities

ANSWER

No. Electro Scan’s low voltage, high frequency current, fully dissipates less than a meter from our sonde, so there is no risk of moving up through a customer’s pipe and getting false readings. You might be surprised to learn that lightning striking the surface of a body of water typically fully dissipates within six (6) meters, but I still wouldn’t recommend being in the water. All we need the current to do is look for openings in a pipe wall, so the escaping current can be measured, quantified, and plugged into our equations to determine its Liters per Second of leakage rate at a given PSI.



Low Voltage Electricity ‘Fully & Safely’ Dissipates in Less Than ½ Meter

Low Voltage – 40mA

KEY

- Homeowner's Responsibility
- Property Boundary
- Utility's Responsibility

Component	Responsibility
Water Supply Pipe	Homeowner
Sanitary Sewer/Sewer Pipe	Homeowner
Gas Utility	Homeowner
Drainage / Water	Utility
Communication Pipe	Utility
Water Main	Utility

Using 24v DC, w/Probe output of 11v AC.

QUESTION #2



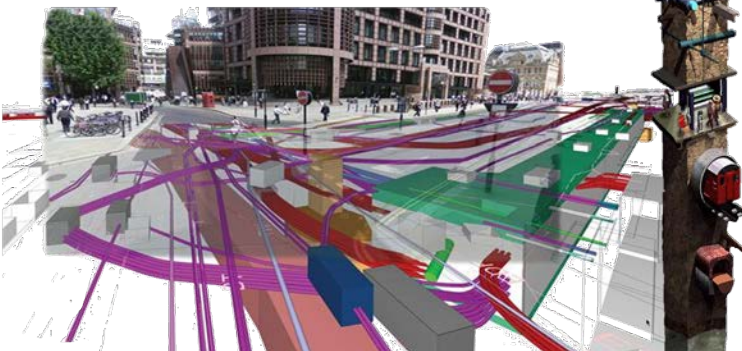
“Does the Electro Scan Grounding Stack Need to be Moved During a 1km survey?”

— Steve Quarmby, United Utilities

ANSWER

No need to move our grounding source. Once electric current comes in contact with ground it has been rates at 5km with an degradation in current. And, we tested in some of the most complex underground locations, like London and Tokyo.

What About Interference?



What About Accuracy & Repeatability?

1. Low Accuracy
Low Repeatability



ACOUSTIC

2. Low Accuracy
High Repeatability



SATELLITE

3. Medium Accuracy
Low Repeatability



HELIUM

4. High Accuracy
High Repeatability



CONDUCTIVITY

Electro Scan Benchmark Testing For Finding Leaks in Plastic Pipe

Measuring the size of leaks has never been more efficient & effective using Electro Scan's patented digital reporting platform.

Electro Scan's Use of Ohms Law Provides Unmatched Data Repeatability.

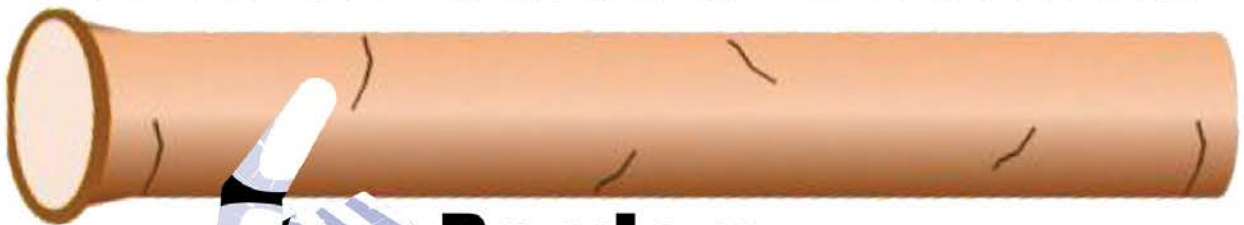
Real time data on the **Blue** screen, after upload to the cloud, shows identical **FORWARD & BACKWARD** results.

What About AI CCTV?



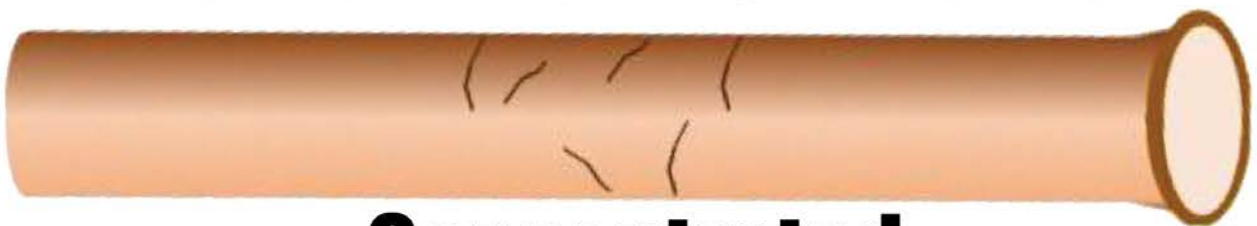
Still Can't Tell If a Leak Goes Through a Pipe.
Still Can't Determine if a CIPP Liner is Watertight.

Distributed Cracks



Random

Localized Cracks



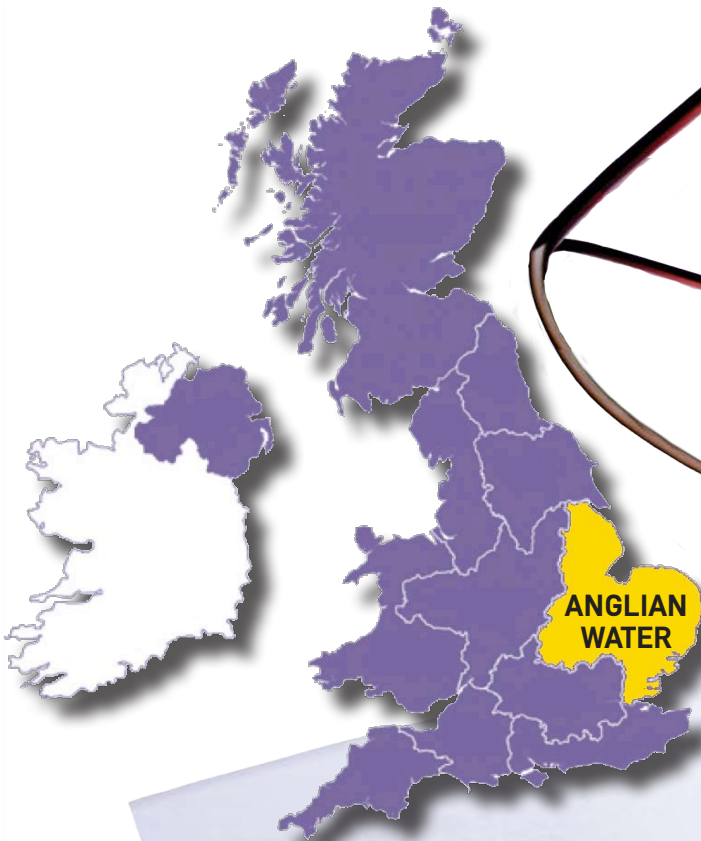
Concentrated

NEW TECHNOLOGY (FELL) WAS NEEDED TO CORRECTLY ASSESS PIPES.

Electro Scan Has 'PASSED'



Anglian Water's 'Materials In Contact' (MIC) Testing.



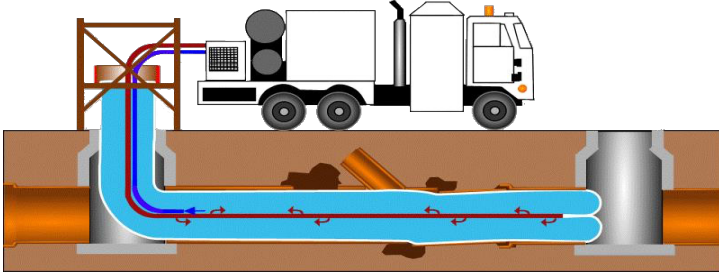
SSIP
SAFETY
SCHEMES IN
PROCUREMENT



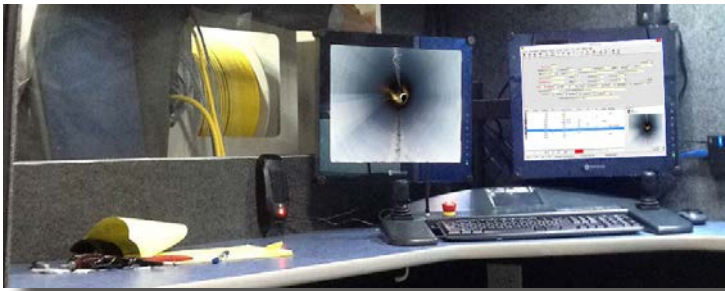
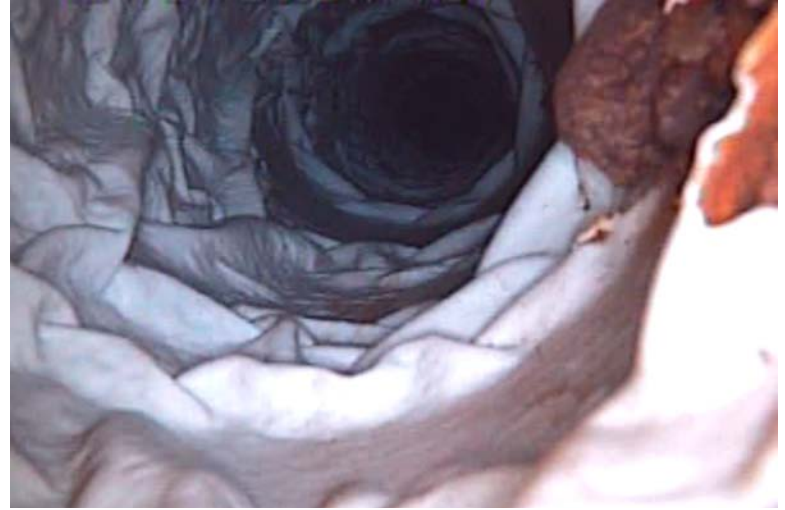
love every drop
anglianwater



Electro Scan Is The Only Technology Able To Test...



CCTV and Visual Inspection Is NOT ABLE To Test CIPP Liners.



Yet, CCTV Has Been #1 Way to Approve New Pipes, Hurting Ratepayers.



...Pipeline Rehabilitation.

Defective Customer Reinstatements

Why Pipes Can Leak More After Rehabilitation



Time for Change !



60 Years Ago

6 Months Ago



Otherwise Get Ready for Missed Leaks.

**A Common Interference
of Acoustic Leak
Detection!**



Team



Chuck Hansen, Founder & CEO.

International pioneer in water & wastewater asset management & condition assessment. Multi-patent holder in pipe leak detection, with nearly 40 years of experience in water & sewer industry. Founded Enterprise Asset Management (EAM) company in 1983 and sold for \$100 million in 2007. Founded Electro Scan in 2011 and Electro Scan (UK) Limited in 2014. Former Chair, ASTM F36.20, Inspection & Renewal Water & Wastewater Infrastructure.



Carissa Boudwin, VP, Chief Revenue Officer.

In charge of corporate wide Technology as a Service (TaaS) and Software as a Service (SaaS) licensing. B.S. George Mason University. Over 5 years with the Company managing data reporting, sales quotes & proposals, technology licensing, and revenue recognition.



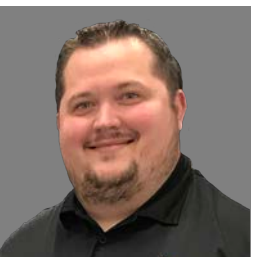
Michael Condran, PE, VP, Chief Engineering Officer.

Responsible for engineered quality assurance, quality control, decision support, and reporting, with 25-years of experience with major global engineering firms. Licenses PE in Colorado, Florida, North Carolina, and Washington.



Mike App, VP, Chief Implementation Officer.

Responsible for all Project Implementations & Deliverables, worldwide, with over 10-years of experience in Cured-In-Place Pipe (CIPP) and trenchless rehabilitation industry.



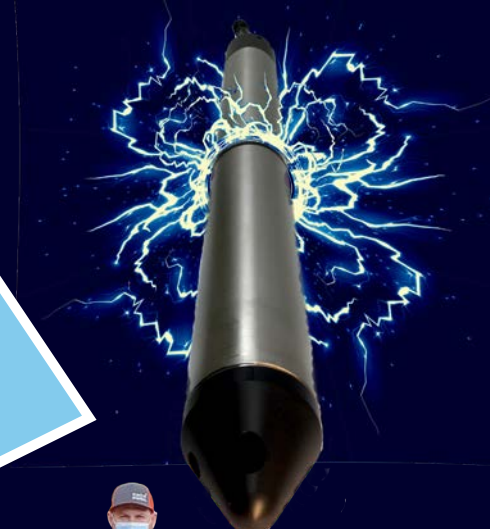
Brad Weston, Director, Electro Scan (UK) Limited

Responsible for UK and EU Water & Sewer Leak Detection Projects, with Master Certificate in Advanced Low Voltage Conductivity. Prior to working with Electro Scan, Weston worked for WRc doing over 1,000 water insertions.

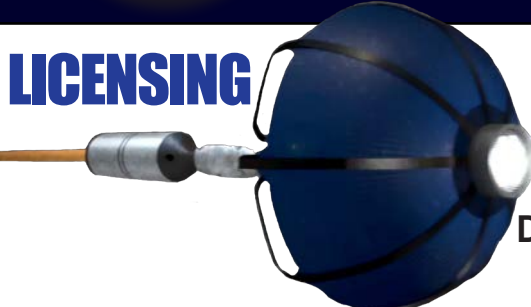
Accurate, Fast, Repeatable



**Field Data
5-Minutes
or Less.**



LICENSING



North America

Contact: Mike App
VP, Business Development
Email: mike@electroscan.com
Mobile: +1 917 817 0090

EU & UK

Contact: Brad Weston
Director, Electro Scan (UK) Limited
Email: brad@electroscan.com
Mobile: +44 7739 358611

Asia Pacific

Contact: Chuck Hansen
Email: chuck@electroscan.com
Mobile: +1 916 275 2921

SERVICES

Worldwide

Contact: Janine Mullinix
VP, Administration
Email: janine@electroscan.com
Mobile: +1 916-873-5714



electro^oscaninc.

1745 Markston Road
Sacramento, California 95825
Tel: +1 916 779 0660
Email: info@electroscan.com
Website: www.electroscan.com

