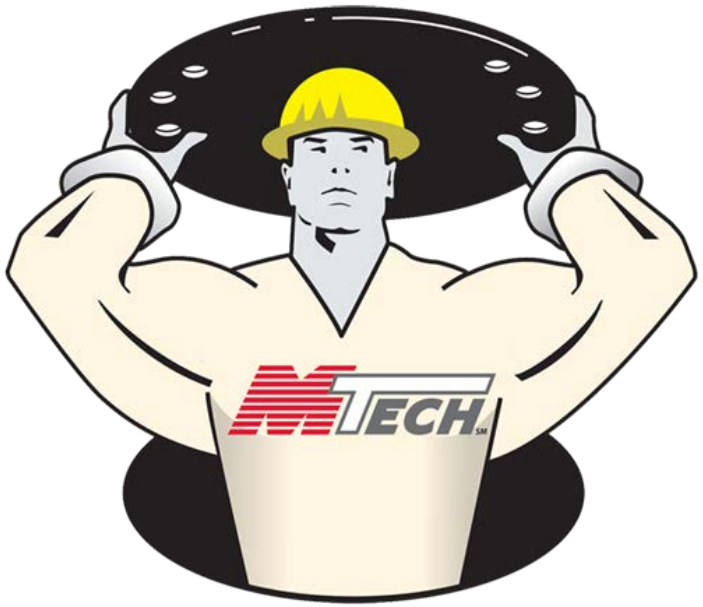
Tri-Cities North Regional Wastewater Authority
Electro Scan Field Demonstration

Friday, March 22, 2013



Tri-Cities North Regional Wastewater Authority (TCA)
3777 Old Needmore Road
Dayton, OH 45424
Tel: 937-236-6558

About TCA

In 1991, MCD announced its plans to divest ownership of its wastewater treatment facilities so that it could focus on its primary mission of flood control. MCD's North Regional plant in Dayton, Ohio, had served the residents of Huber Heights (population 40,000), Vandalia (population 13,500), and Tipp City (population 7,500), as well as portions of Montgomery and Miami counties, since 1985.

Previously, each city had its own wastewater treatment facility. When they were unable to finance upgrades required by secondary treatment standards, the cities asked MCD to construct a plant to serve the entire region.

A Joint Venture Agreement

An Ohio statute allows municipalities to enter into joint venture agreements for the purposes of providing utility services. The three city managers met over two years and, with assistance from attorneys and a financial consultant, drafted a joint ownership agreement.

The next step was to obtain approval of MCD, the city councils, the Ohio Water Development Authority, and Ohio EPA. In late 1995, conservancy court judges unanimously approved the transfer of ownership of the North Regional wastewater treatment facility to the three cities. The court unanimously approved the petition.

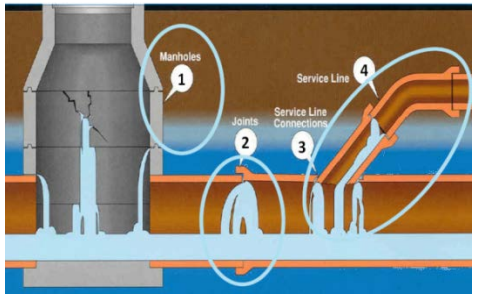
By mid-May 1996, the councils of Huber Heights, Vandalia, and Tipp City had passed ordinances approving the agreement, and the Ohio EPA had agreed to transfer the plant's wastewater discharge permit. A few weeks later, the Ohio Water Development Authority approved an agreement to assign the $12.5 million in outstanding debt on the facility to the three cities.

The Tri-Cities North Regional Wastewater Authority (TCA) was formed June 11, 1996.

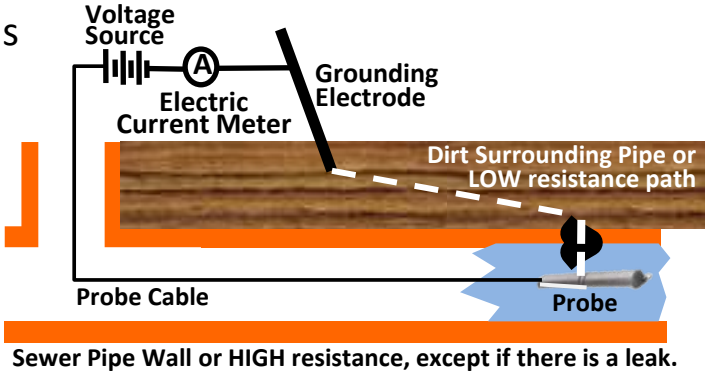
TCA's finance committee consists of the finance directors from each city, while the utility directors comprise the technical committee. These committees and the general manager advise the governing board of trustees, made up of the three city managers. Voting power on the board is based on flow to plant. Although Huber Heights contributes about 52 percent of the flow, its voting power is limited to 49.9 percent, and the balance is given to other cities on a pro rata basis. A majority vote is necessary to pass any action, and representation of at least 60 percent of the flow must be present for a meeting to have a quorum.

What is Electro Scan?*

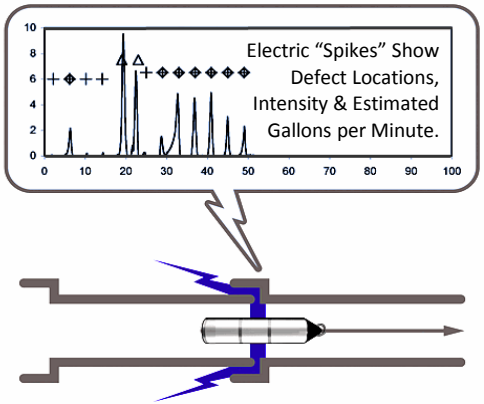
1. **What Does Electro Scan Do, That CCTV Cannot?** Answer: Find infiltration. Infiltration is a key factor causing Sanitary Sewer Overflows (SSOs) and Combined Sewer Overflows (CSO) caused by cracks & defects found in manholes, sewer mains, service connections, and laterals. Given the limitation of CCTV – i.e. not able to visually find leaks -- Electro Scan automatically finds , locates and estimates the amount of infiltration caused by defects. Electro Scan can also certify newly installed, recently repaired and rehabilitated pipe lining projects as "leak free" and can work year around, in dry or wet weather.



2. How Does It Work? Sewers are made of non-conductive materials (e.g. asbestos concrete, brick, clay, cement, plastic, reinforced concrete, etc.), so no electrical current should ever be able to "leak" or escape into the ground from inside the pipe – unless, of course, there is a crack or break in a pipe. Electro Scan's patent-pending technology releases a focused array of low-voltage high-frequency electrical current that locates and quantifies all defects.



3. Who Has Endorsed or Used Electro Scan? Electro Scan has been tested in numerous U.S. EPA studies and found superior to CCTV in finding the location and quantification of defects that cause leaks. Electro Scan is the only company with products in compliance with ASTM Standard F2550-06. Winning international acceptance, Electro Scan has recorded nearly 1 million feet of scans worldwide and represents the next generation in leak detection and certification of pipeline repairs & rehabilitation.

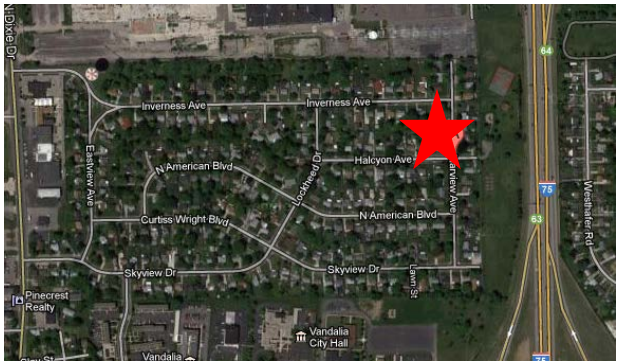


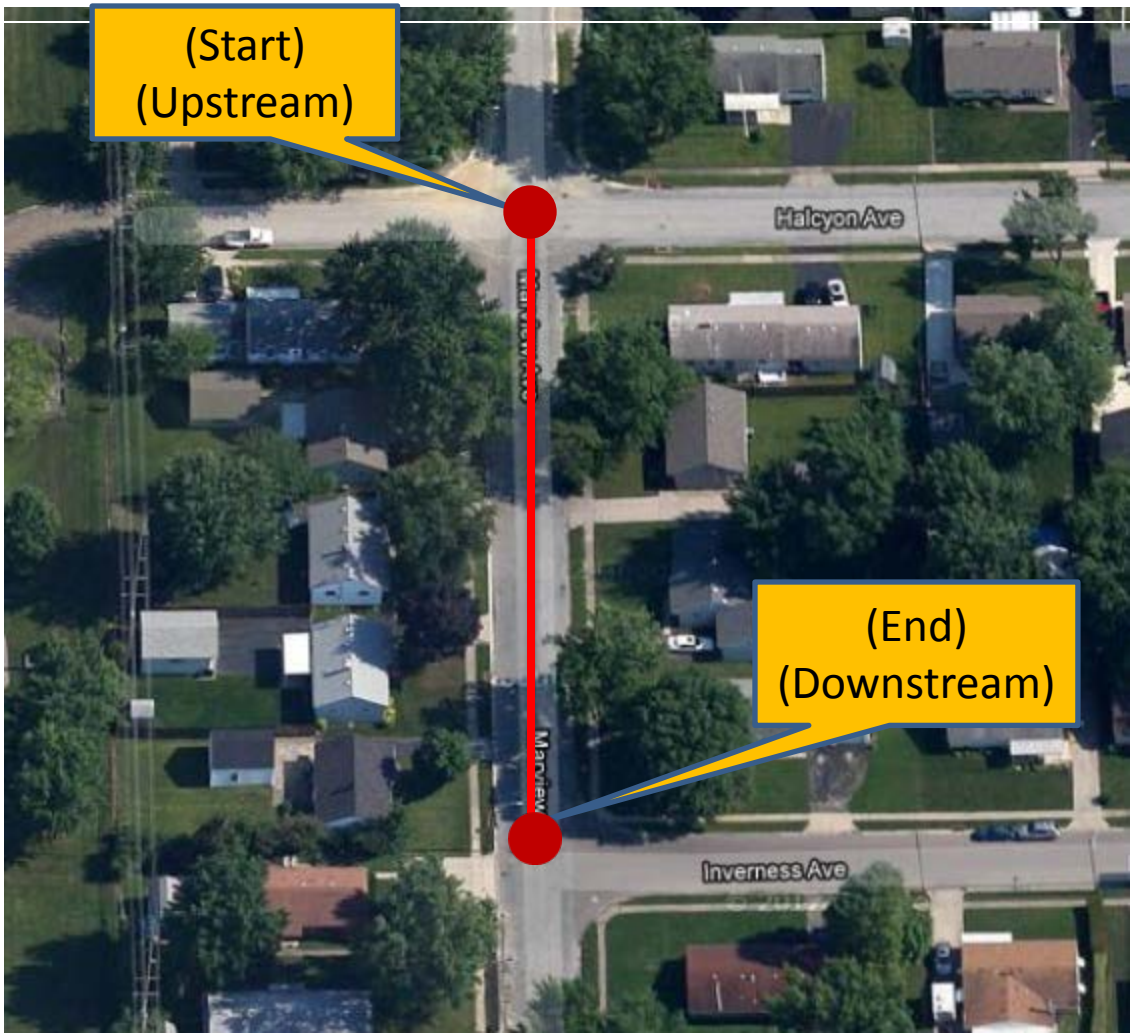
electroscaninc.

*Patent-pending.

Kickoff Meeting

Scan #1
Marview Avenue



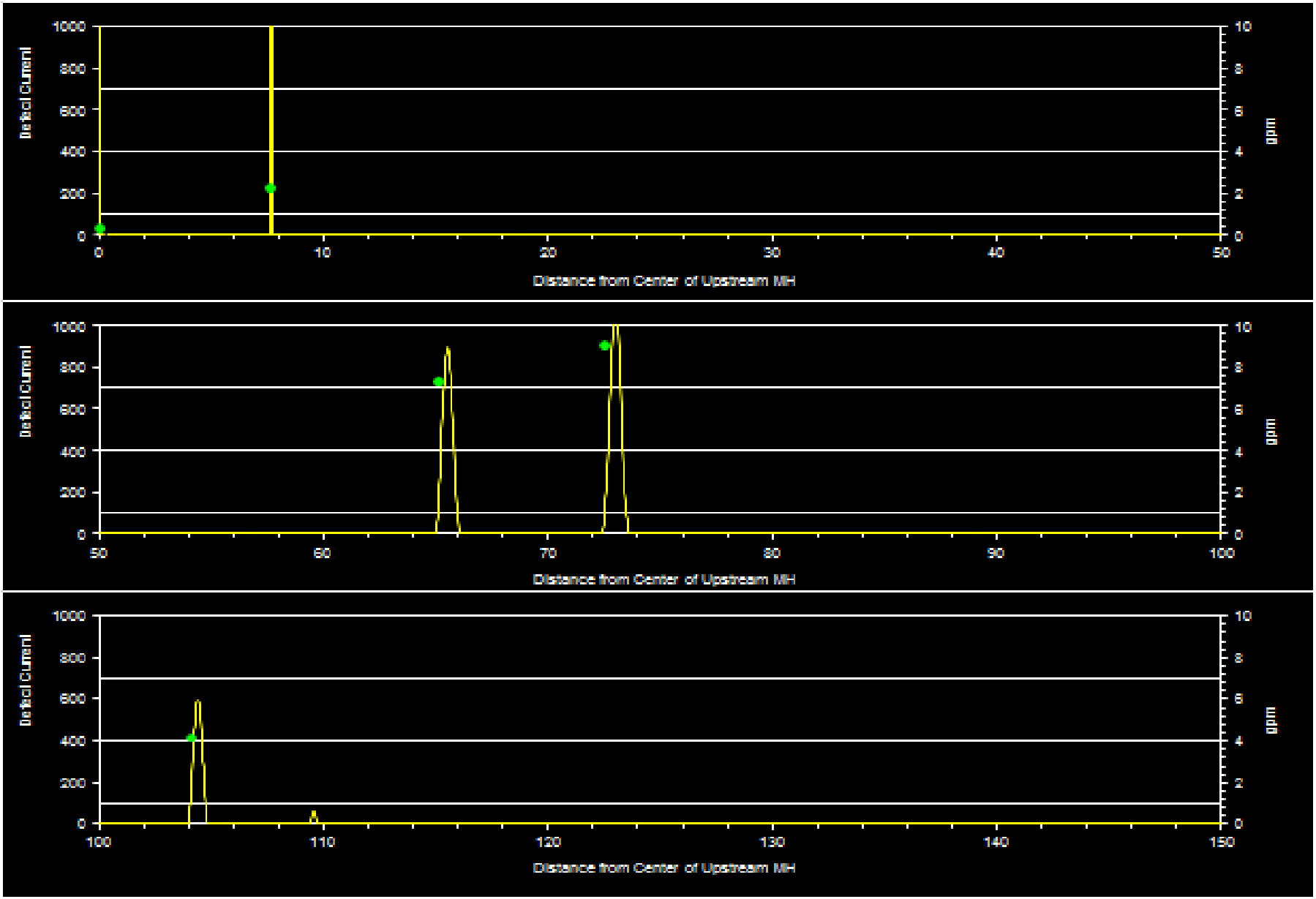


Scan #1
Marview Avenue Electro Scan Demo

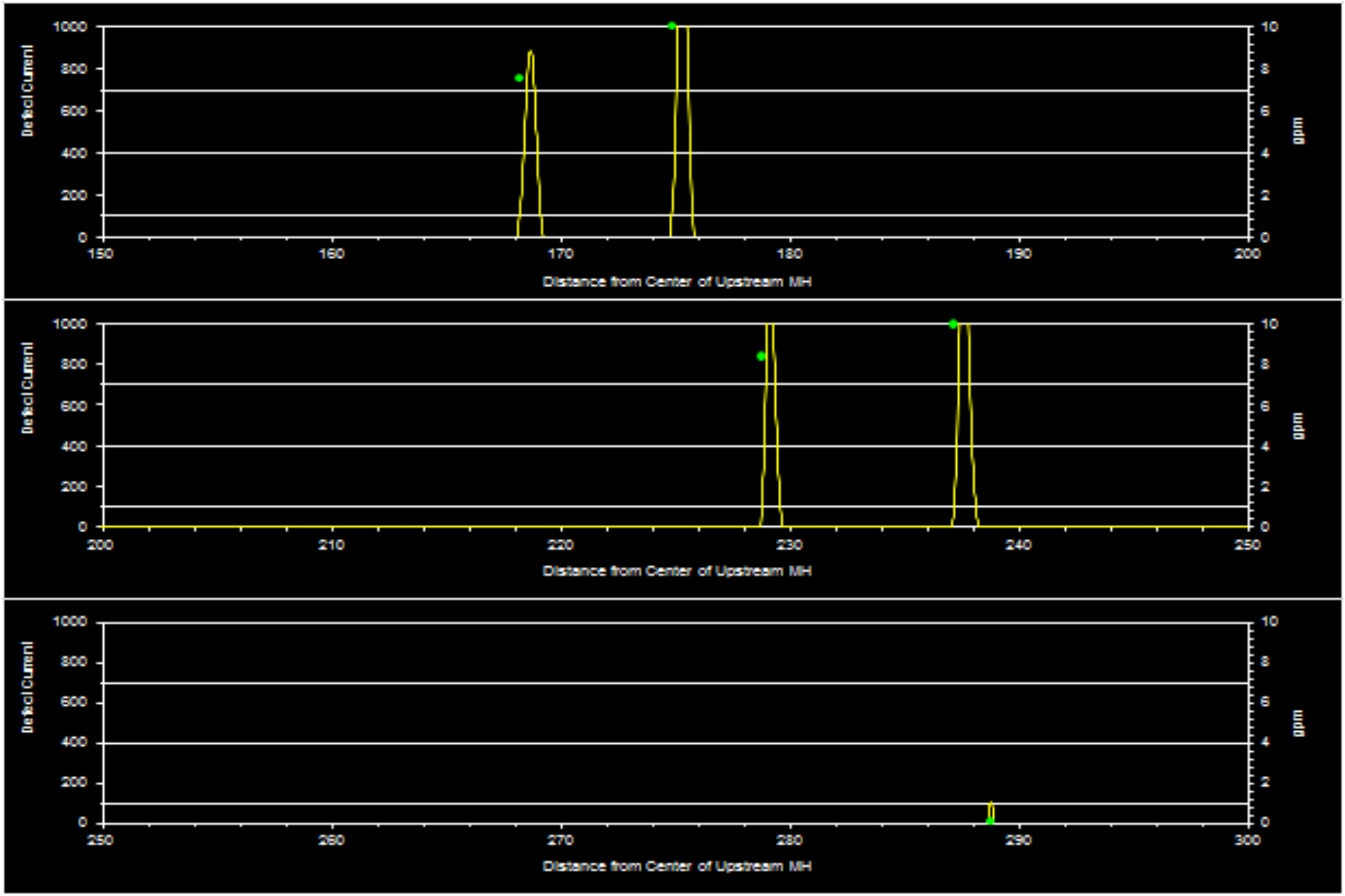
- 8” VCP sanitary sewer line, laid at minor grade, with a minimal flow and 8 lateral connections. Pipe segment had been lined within last few years using a CIP lining process. MH to MH distance is about 300 feet. Electro Scan was stopped short at about 295 feet

- Objective: Determine if Electro Scan can identify any defects within the lining.

Scan #1 - Marview Avenue - Defect Graph



Scan #1 - Marview Avenue - Defect Graph (cont'd)



Scan #1 - Marview Avenue - Defect Chart

Start of Anomaly	End of Anomaly	Length of Anomaly	Maximum Current Level of Anomaly		Max. Current Anomaly Grading	Defect Flow	Defect Flow Grading
0.03	0.03	0.00	997.00		L	0.37	S
7.66	7.71	0.05	2798.00		L	2.29	M
65.12	65.97	0.85	892.00		L	7.33	L
72.56	73.48	0.93	1072.00		L	9.08	L
104.07	104.75	0.68	599.00		M	4.07	L
168.19	169.12	0.93	891.00		L	7.57	L
174.85	175.73	0.88	1535.00		L	11.71	L
228.75	229.56	0.80	1144.00		L	8.42	L
237.17	238.09	0.93	1430.00		L	11.19	L
288.74	288.77	0.03	106.00		S	0.08	S

Marview Ave. (Scan 1)
Findings and Conclusions

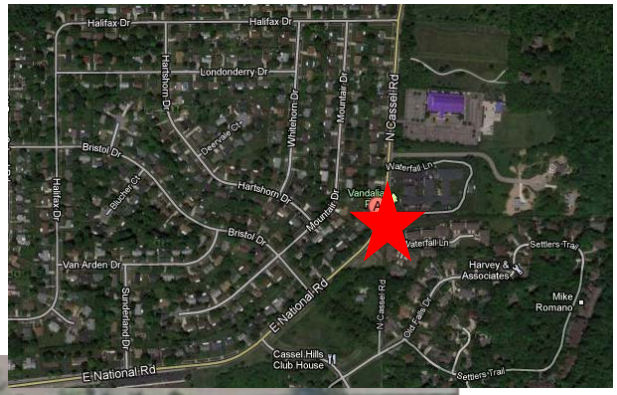
Anomaly Picking Threshold	100.00	Grade Current Levels	Number	Length	% Length of Pipe Tested	% of Total Anomaly Length	Grade Flow Levels	Number	Flow gpm	Flow per 100ft of pipe	% of Total Flow
Grade	Large	>700	8	5.4	2%	88%	>4	7	59.4	18.6	96%
	Medium	700 to 400	1	0.7	0%	11%	4 to 1	1	2.3	0.7	4%
	Small	<400	1	0.0	0%	0%	<1	2	0.4	0.1	1%
	Total		10	6.1	2%	100%	<1	10	62.1	19.4	100%

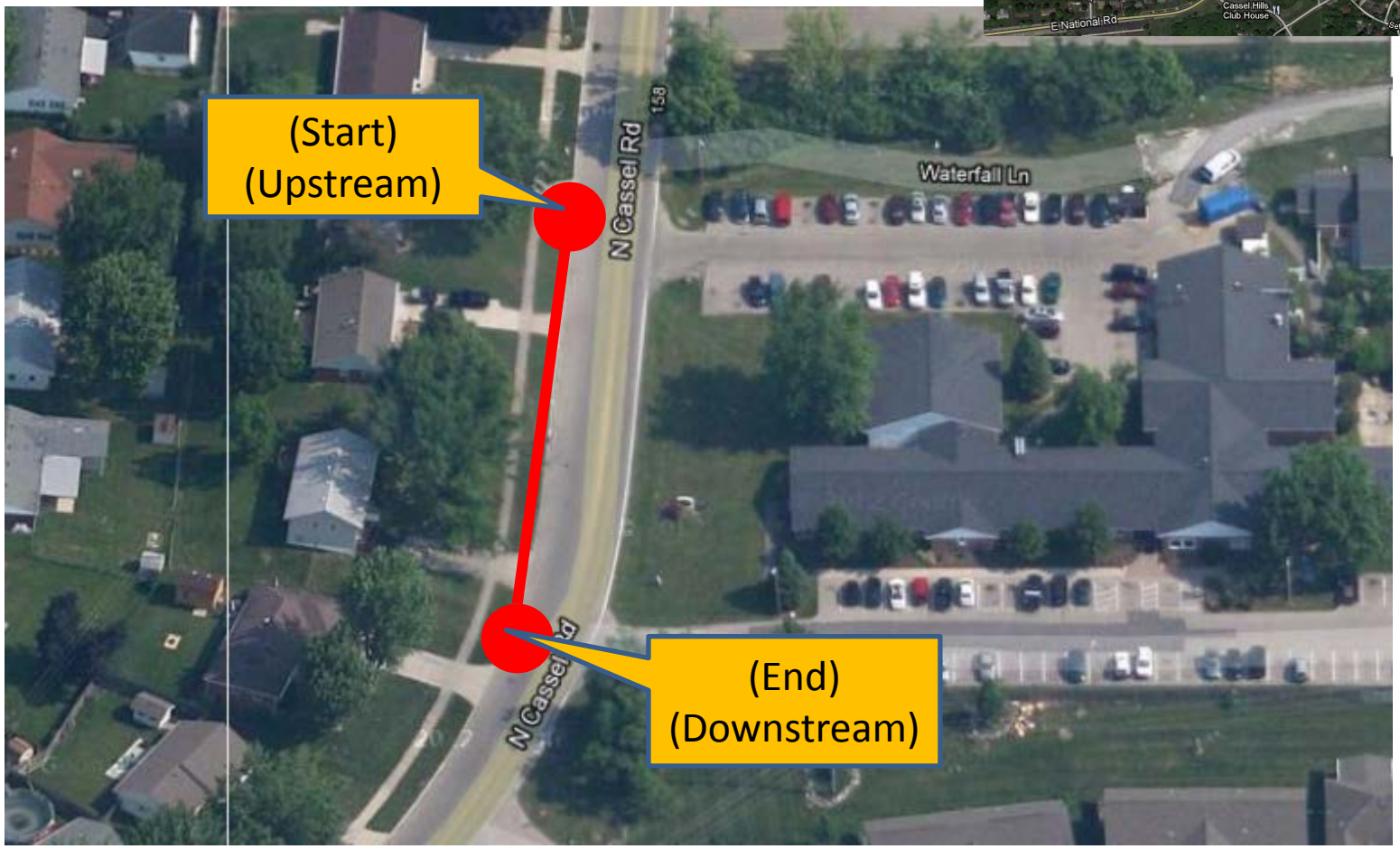
Electro Scan located **10** total defects – one (1) small, one (1) medium, and eight (8)large. Based on the size and quantity of those defects, it is estimated that this pipe length could infiltrate **62.1 gallons per minute.**

The defects appear to correspond to lateral connections. According to information Electro Scan and MTech received, no lateral or connection lining or sealing method had been used. This pipe has the possibility of infiltrating as much as 89,424 gallons per day. Given that this pipe was relined with CIPP, it is still a very significant potential source of infiltration. Almost 100% of the potential infiltration of this pipe is from the lateral re-instatement connections.

GPM estimates ±40%, assume a 1 ft of water head over pipe.

Scan #2 - Cassel Road





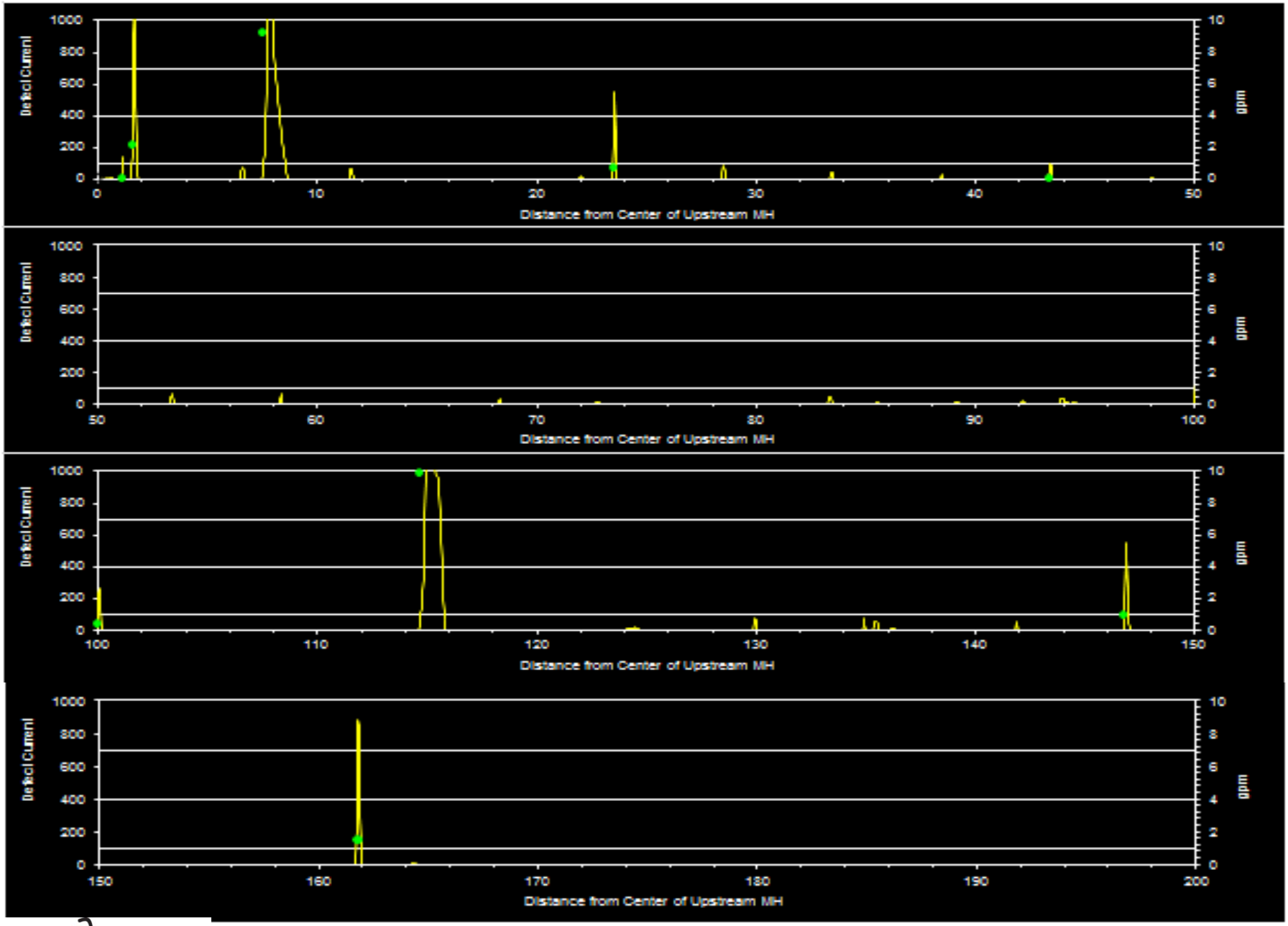
Scan #2 - Cassel Rd. – Electro Scan Demo

Tri Cities NORTH REGIONAL WASTEWATER AUTHORITY
On behalf of Huber Heights, Vandalia and Tipp City

VEOLIA ENVIRONMENTAL SERVICES

- 8” VCP sanitary sewer line, laid at minor grade, with medium flow with a few lateral connections. MH to MH distance is about 170 feet.
- Objective: Determine if Electro Scan can identify any defects.

Scan #2 - Cassel Rd. - Defect Graph



Scan #2 - Cassel Rd. - Defect Chart

Start of Anomaly	End of Anomaly	Length of Anomaly	Maximum Current Level of Anomaly	Max. Current Anomaly Grading	Defect Flow	Defect Flow Grading
1.13	1.13	0.00	143.00	S	0.05	S
1.55	1.78	0.23	1159.00	L	2.21	M
7.56	8.51	0.95	1383.00	L	9.24	L
23.48	23.58	0.10	549.00	M	0.73	S
43.39	43.39	0.00	100.00	S	0.06	S
100.02	100.12	0.10	260.00	S	0.35	S
114.71	115.77	1.05	1754.00	L	14.74	L
146.76	146.94	0.17	548.00	M	0.99	S
161.73	161.91	0.18	882.00	L	1.55	M

Scan #2 - Cassel Rd.
Findings and Conclusions

Anomaly Picking Threshold	100.00	Grade Current Levels	Number	Length	% Length of Pipe Tested	% of Total Anomaly Length	Grade Flow Levels	Number	Flow gpm	Flow per 100ft of pipe	% of Total Flow
Grade	Large	>700	4	2.4	1%	87%	>4	2	24.0	14.5	80%
	Medium	700 to 400	2	0.3	0%	10%	4 to 1	2	3.8	2.3	13%
	Small	<400	3	0.1	0%	4%	<1	5	2.2	1.3	7%
	Total		9	2.8	2%	100%	<1	9	29.9	18.1	100%

Electro Scan located **9** total defects – three (3) small, two (2) medium, and four (4) large. Based on the size and quantity of those defects, it is estimated that this pipe length could infiltrate **29.9 gallons per minute.**

The majority of this pipe (including most joints) are in good shape. However, from the graph and chart, you can almost all the potential infiltration is occurring at the four large and two medium defects. The one defect alone at 115' accounts for 50% of the potential infiltration. Because of these handful of defects, this pipe has the potential to infiltrate 43,056 gallons per day.

GPM estimates ±40%, assume a 1 ft of water head over pipe.

How Electro Scan Estimates GPM Infiltration

While Electro Scan's standard graphs display the Max Defect Current, Electro Scan's estimated Gallon per Minute (Defect Flow) is based on the Defect Area and the Electric Current sustained over that Area.

Start of Anomaly	End of Anomaly	Length of Anomaly	Maximum Current Level of Anomaly	Max. Current Anomaly Grading	Est. GPM Flow	Est. GPM Grading
1.23	1.30	0.08	146.00	S	0.19	S
1.43	1.43	0.00	115.00	S	0.05	S
3.33	3.33	0.00	104.00	S	0.04	S
8.26	8.44	0.18	291.00	S	0.60	S
13.12	13.20	0.08	216.00	S	0.28	S
18.15	18.20	0.05	137.00	S	0.15	S
18.95	19.10	0.15	328.00	S	0.61	S
20.95	21.11	0.15	544.00	M	0.95	S
23.84	24.26	0.42	698.00	M	1.93	M
24.51	24.56	0.05	245.00	S	0.22	S
28.02	28.14	0.12	330.00	S	0.56	S
31.87	32.05	0.18	536.00	M	1.02	M
35.52	35.75	0.23	559.00	M	1.26	M

'**Large Current Readings over a Large Area**' often result in a large GPM or Defect Flow, frequently found in defects at a service connection. In other cases '**Large Current Readings over a Small Area**' result in small and medium GPMs, frequently showing defects at joints.

References

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