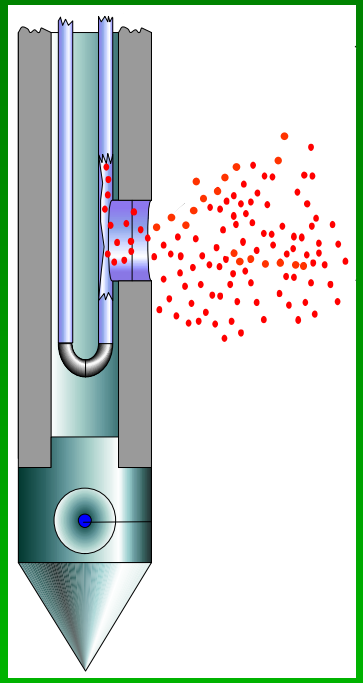
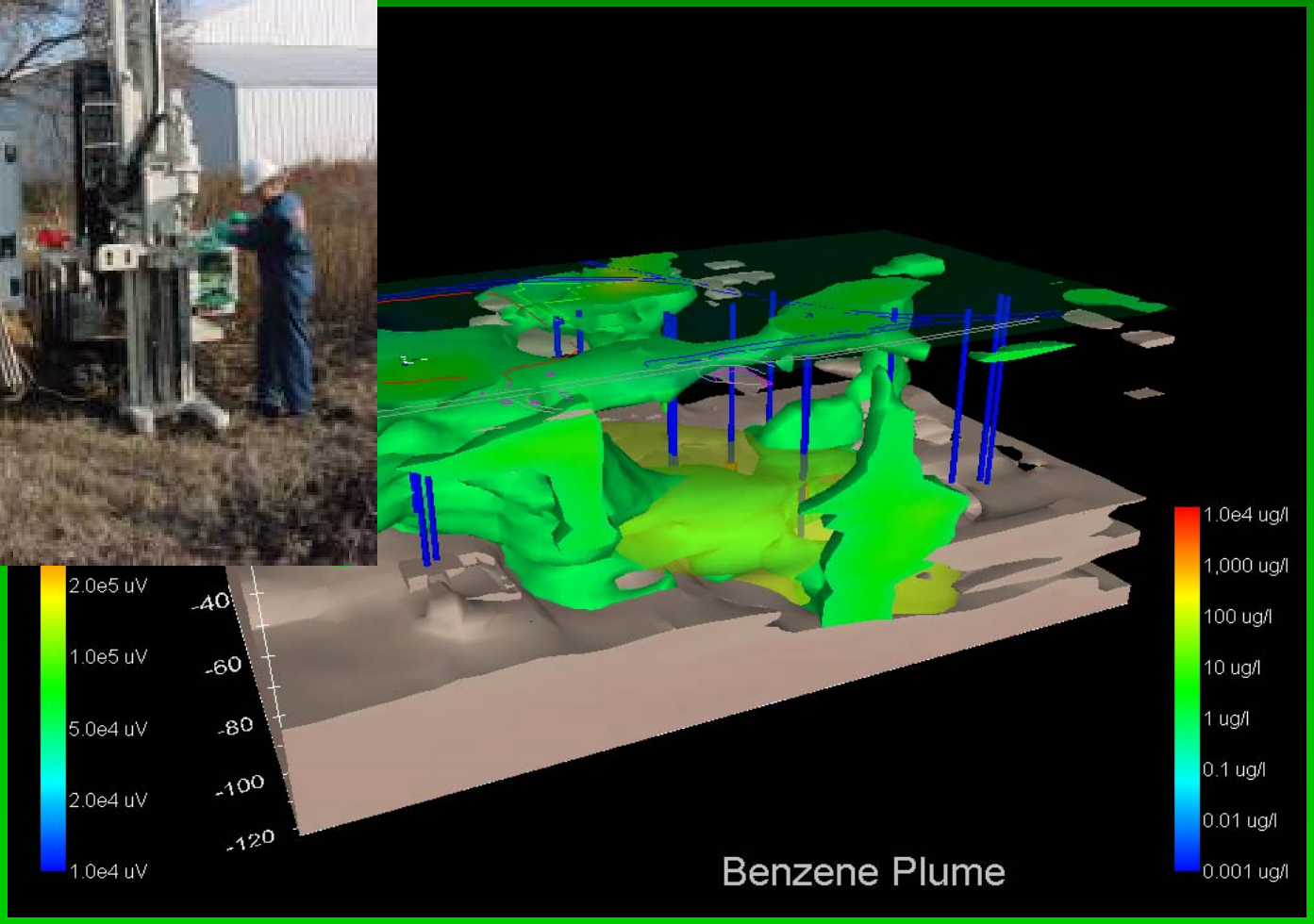
An Introduction
to the

Membrane Interface Probe

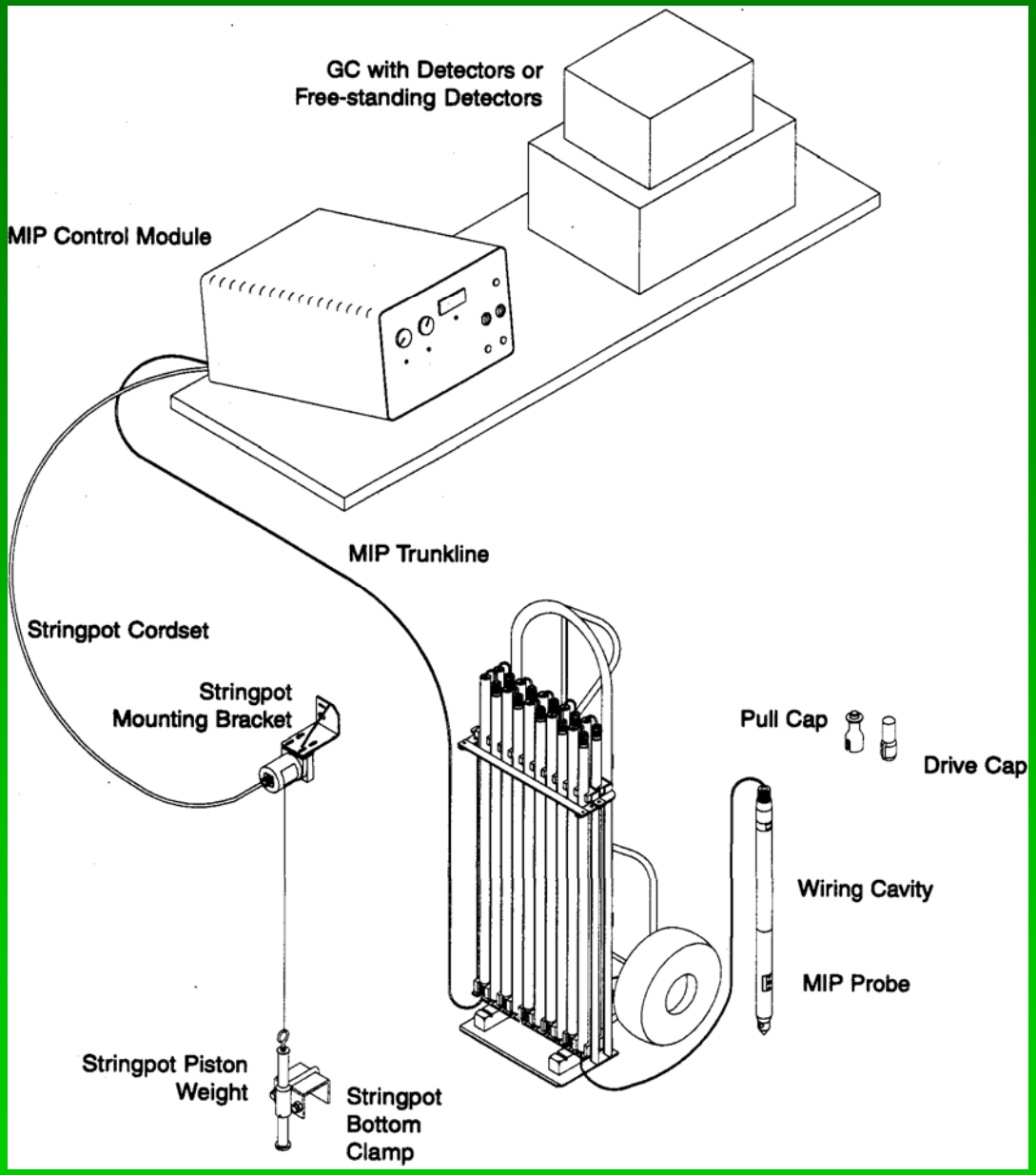


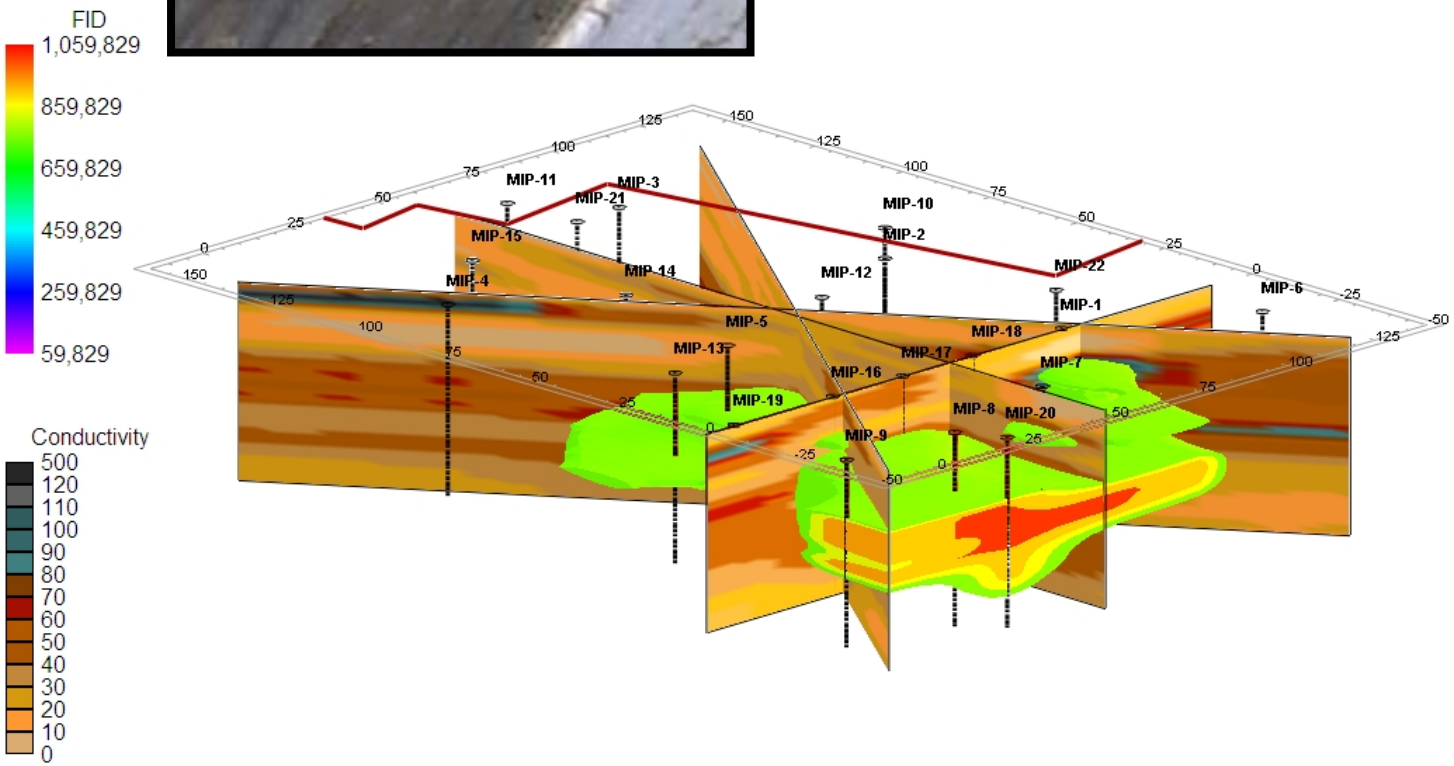
Pete Cooke, P.G.

Dept of Toxic Substances Control


2.0e5 uV
1.0e5 uV
5.0e4 uV
2.0e4 uV
1.0e4 uV
-40
-60
-80
-100
-120
1.0e4 ug/l
1,000 ug/l
100 ug/l
10 ug/l
1 ug/l
0.1 ug/l
0.01 ug/l
0.001 ug/l
Benzene Plume

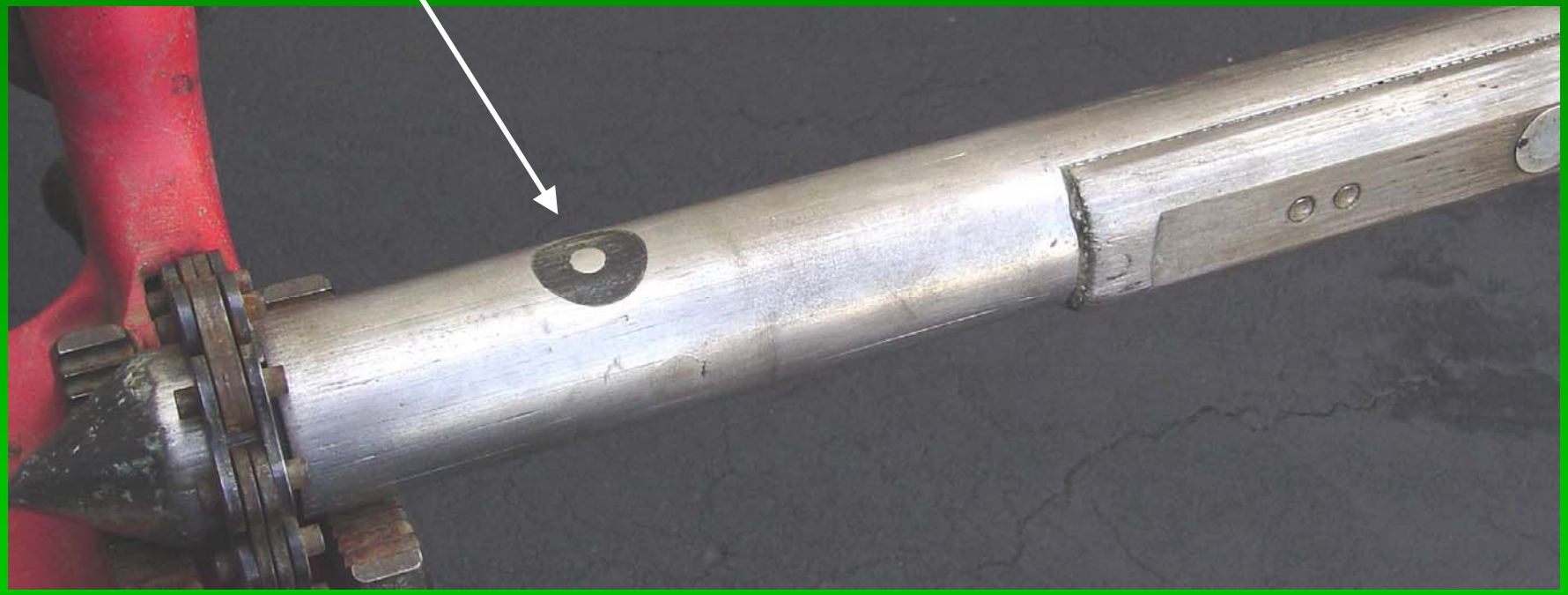
- General description
- Advantages, disadvantages, comparisons
- Set up and use
- Equipment problems
- Costs
- Pete’s MIP Checklist


GC with Detectors or
Free-standing Detectors
MIP Control Module
MIP Trunkline
Stringpot Cordset
Stringpot
Mounting Bracket
Pull Cap
Drive Cap
Wiring Cavity
MIP Probe
Stringpot Piston
Weight
Stringpot
Bottom
Clamp

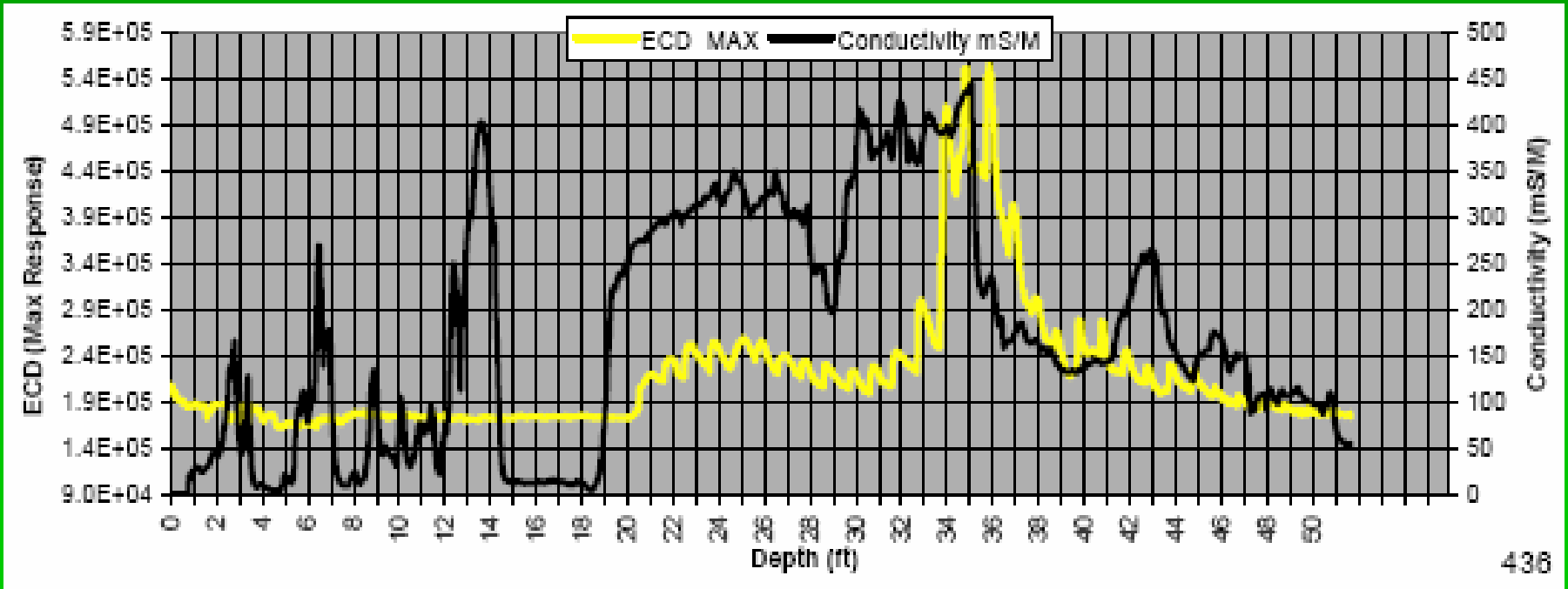

FID
1,059,829
859,829
659,829
459,829
259,829
59,829
Conductivity
500
120
110
100
90
80
70
60
50
40
30
20
10
0
MIP-11
MIP-3
MIP-21
MIP-10
MIP-2
MIP-15
MIP-14
MIP-12
MIP-22
MIP-4
MIP-1
MIP-6
MIP-5
MIP-18
MIP-13
MIP-17
MIP-7
MIP-16
MIP-19
MIP-8
MIP-20
MIP-9

M membrane
I interface
P probe

Soil Conductivity Sensor



Geoprobe


ECD MAX
Conductivity mS/M
ECD (Max Response)
Conductivity (mS/M)
Depth (ft)
5.9E+05
5.4E+05
4.9E+05
4.4E+05
3.9E+05
3.4E+05
2.9E+05
2.4E+05
1.9E+05
1.4E+05
9.0E+04
500
450
400
350
300
250
200
150
100
50
0
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50

MIP Advantages

- Fast
- Sample location efficiency
- No IDW
- Vadose and ground water
- Cheaper
- Industrial hygienist happiness

MIP Disadvantages

- Only VOCs
- DLs 1-5 ppm
- Limited depth
- Refusal
- Unconsolidated sediments

MIP Comparison

UV Fluorescence and

LIF (ROST/LIF)

-PAHs, fuel releases

MIP Comparison

Thermal Desorption

VOC Sampler

-needs more development

MIP Comparison

Hydrosparge VOC Sensing System

-ground water only

MIP Comparison

Ribbon NAPL Sampler

(includes FLUTe)

-direct contact with NAPL

-no concentration estimate

MIP Comparison

Geophysical methods

-NAPL only

-expectations not met

MIP Comparison

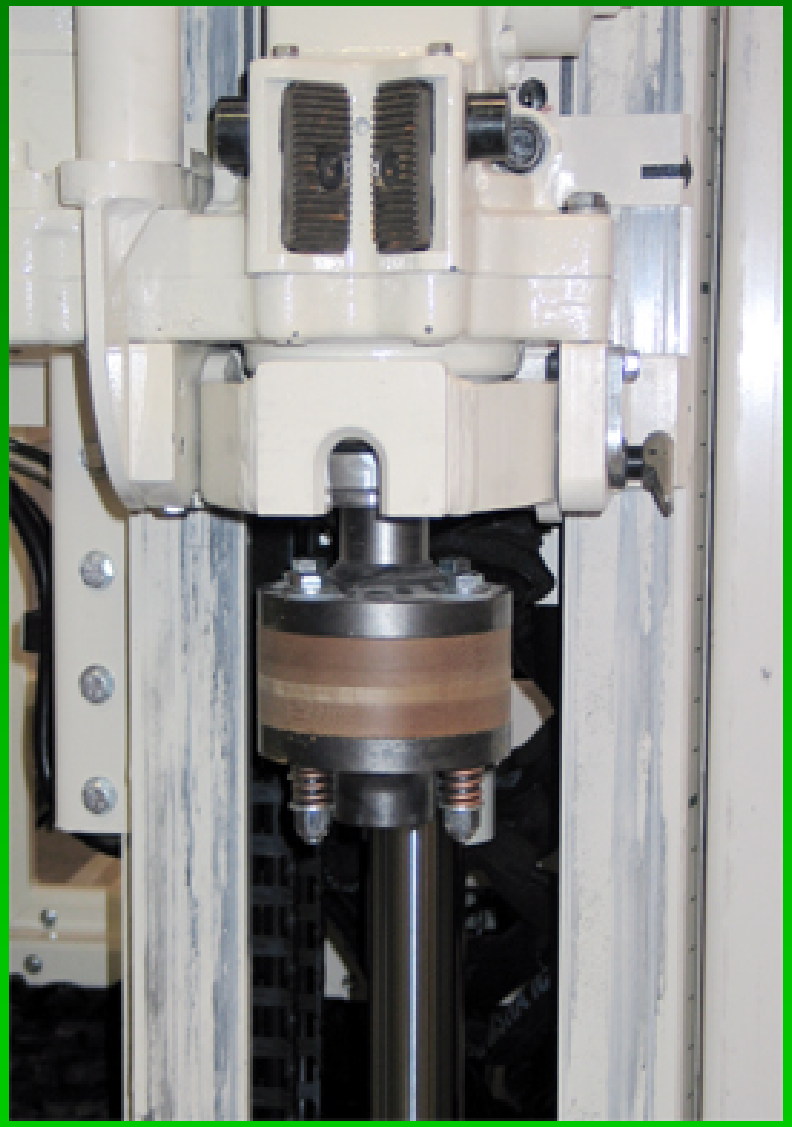
Chemical Tracer Tests

-very effective

-complex and expensive

Setting Up and Using the MIP

PRECISION



Geoprobe

Domerk
Geopulse
5890
TOOLS
OFFICE SUPPLIES

Range Results
0 1
1 2
2 4
3 8
4 16
5 32
6 64
7 128
8 256
9 512
10 1024
GAS CHROMATOG
OVEN
RATE
FINAL TIME
STATUS
START
STOP

MIP Quality Control

Standard Summary

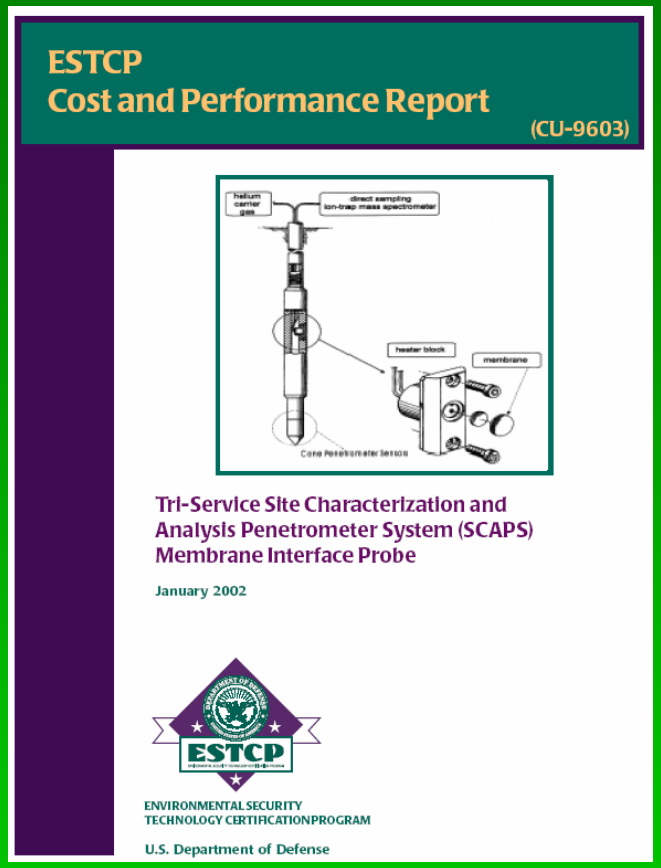
Boring Name	Date	Time	Standard	PID Response	ECD Response	Pressure (PSI)	Response Time (s)
QA QC 1	Nov 13 2006	09:05	1 ppm TCE & Toluene	Yes	Yes	14.23	60
MIP-6	Nov 13 2006	09:14				14.08	60
QA QC 2	Nov 13 2006	10:36	1 ppm TCE & Toluene	Yes	Yes	14.80	56
MIP-5	Nov 13 2006	11:17				14.99	56
QA QC 3	Nov 13 2006	13:00	1 ppm TCE & Toluene	Yes	Yes	14.54	56
MIP-7	Nov 13 2006	13:07				14.63	56
QA QC 4	Nov 13 2006	14:25	1 ppm TCE & Toluene	Yes	Yes	14.44	58
MIP-1	Nov 13 2006	14:31				14.38	58
QA QC 5	Nov 14 2006	08:40	1 ppm TCE & Toluene	Yes	Yes	14.81	58
MIP-16	Nov 14 2006	08:49				14.74	58
QA QC 6	Nov 14 2006	10:11	1 ppm TCE & Toluene	Yes	Yes	13.81	60
MIP-8	Nov 14 2006	10:23				13.98	60
QA QC 7	Nov 14 2006	12:28	1 ppm TCE & Toluene	Yes	Yes	14.81	65
MIP-9	Nov 14 2006	12:38				14.73	65
QA QC 8	Nov 14 2006	14:23	1 ppm TCE & Toluene	Yes	Yes	14.80	57
MIP-2	Nov 14 2006	14:31				14.84	57
QA QC 9	Nov 15 2006	08:27	1 ppm TCE & Toluene	Yes	Yes	15.20	55
MIP-15	Nov 15 2006	08:36				14.88	55
QA QC 10	Nov 15 2006	10:30	1 ppm TCE & Toluene	Yes	Yes	14.19	62
MIP-14	Nov 15 2006	10:44				13.79	62
QA QC 11	Nov 15 2006	12:37	1 ppm TCE & Toluene	Yes	Yes	14.64	65
MIP-3	Nov 15 2006	12:45				14.41	65
QA QC 12	Nov 15 2006	13:58	1 ppm TCE & Toluene	Yes	Yes	14.17	64
MIP-4	Nov 15 2006	14:11				14.42	64
QA QC 13	Nov 17 2006	08:38	1 ppm TCE & Toluene	Yes	Yes	14.95	68
MIP-13	Nov 17 2006	08:54				14.87	68
QA QC 14	Nov 17 2006	10:21	1 ppm TCE & Toluene	Yes	Yes	14.54	64
MIP-11	Nov 17 2006	10:33				14.63	64

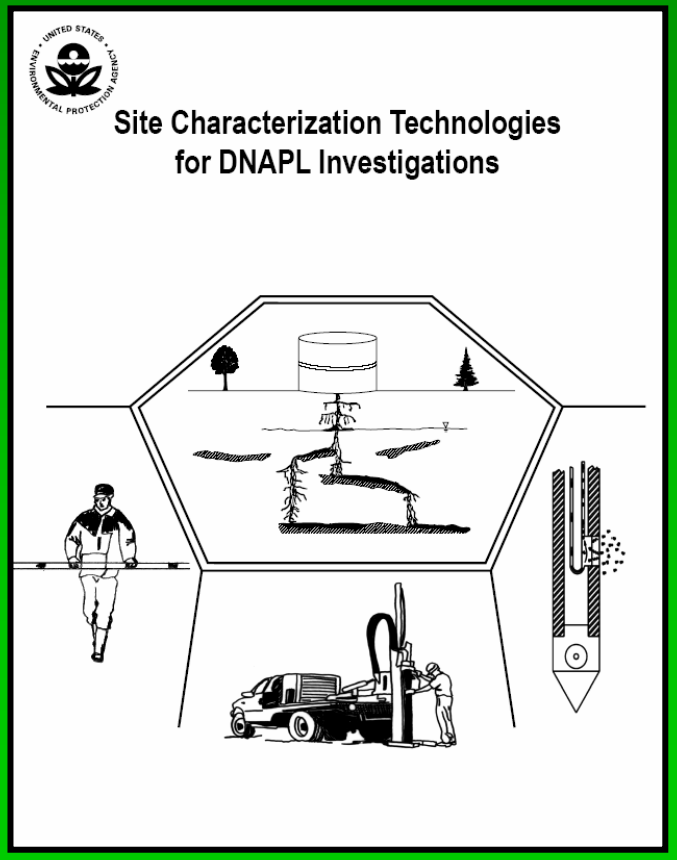
MIP Detection Equipment

FC4000
Field
Computer

Gas Chromatograph

MP3500 MIP Controller


ESTCP
Cost and Performance Report
(CU-9603)
Tri-Service Site Characterization and Analysis Penetrometer System (SCAPS) Membrane Interface Probe
January 2002
ESTCP
ENVIRONMENTAL SECURITY TECHNOLOGY CERTIFICATION PROGRAM
U.S. Department of Defense


Site Characterization Technologies for DNAPL Investigations

INJECTOR
HEATER
POWER
MICRO-INFINITY
PV
SV
MENU
▲/MAX
▶/MIN
ENTER
TEMPERATURE CONTROL
OFF
ON
FLOW CONTROLLER
REGULATOR
Geoprobe
MIP Controller • MP3500 Series

MIP Service Specialist

MIP Service Specialists are experienced MIP contractors that have agreed to adhere to the Geoprobe® Systems MIP SOP (Technical Bulletin No. MK3010). These contractors co closely with Geoprobe® Systems by staying current with MIP training each year. To become a MIP Service Specialist these contractors have completed training, had initial data revie Geoprobe® Systems, and operate the MIP system per the MIP SOP.

Geoprobe® Systems,KS **Member Since 2004**	**Zebra Environmental Corp. East Coast** **Member Since 2004**
Fisch Environmental Services, CA **Member Since 2004**	**Vironex INC., Nationwide** **Member Since 2005**
Mountain Research LLC., PA **Member Since 2005**	**Precision Sampling INC. CA, FL** **Member Since 2006**

Certificate of Attendance

Jeremy Januszewicz

Vironex

completed a 24-hour training course in the operation of

Direct Image® Membrane Interface Probe (MIP)

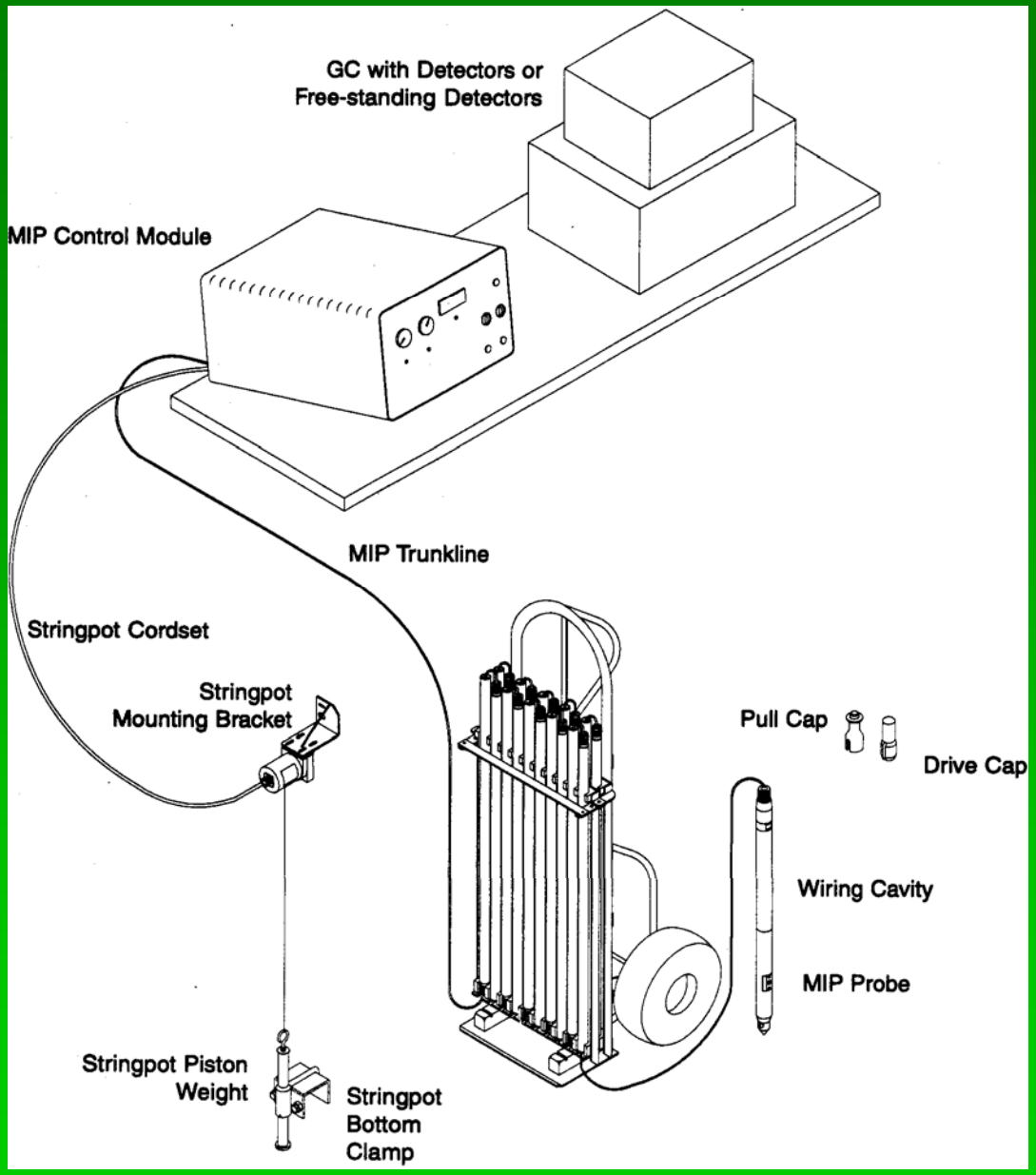
from Geoprobe Systems®

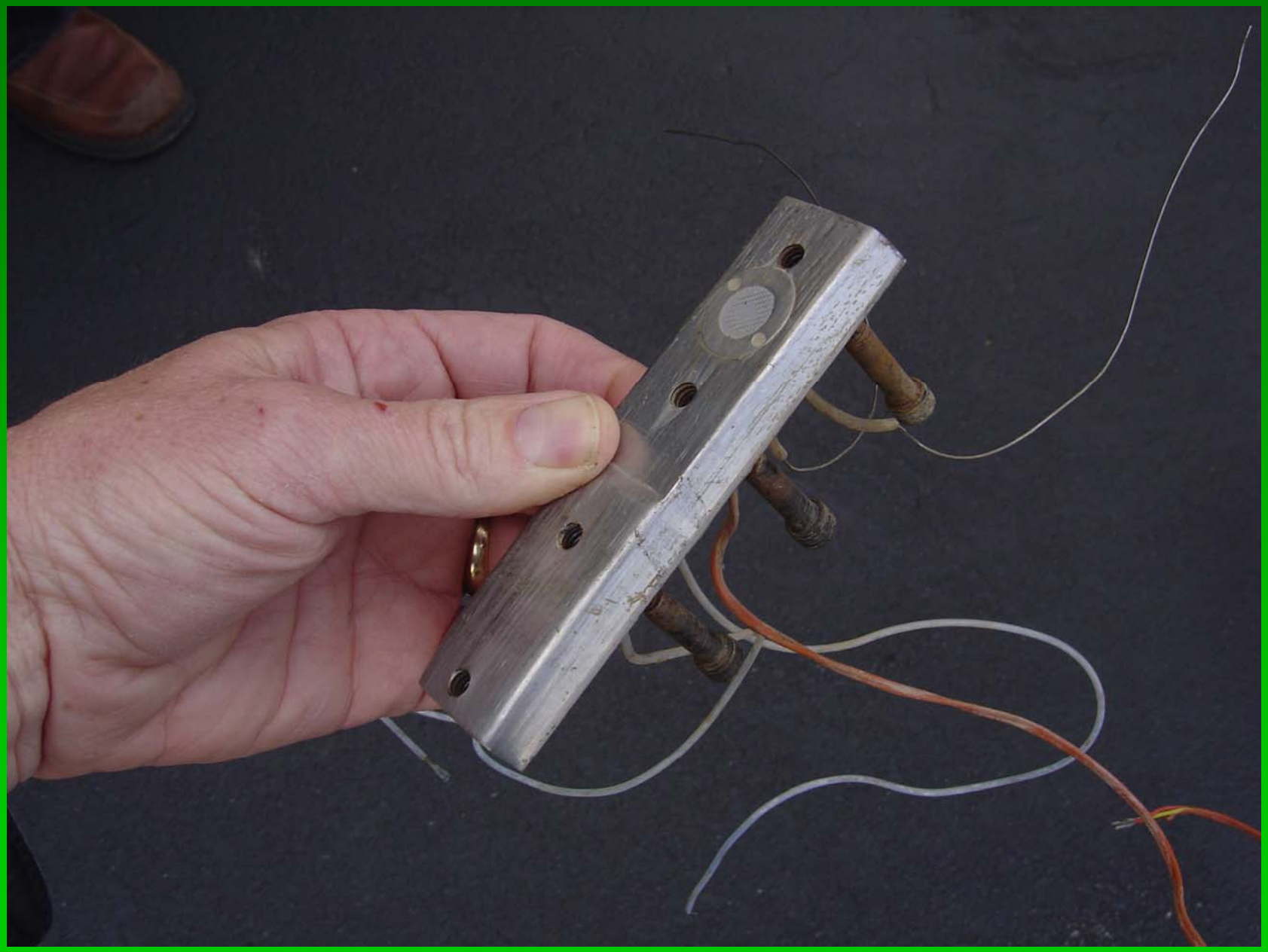
Training included instruction in the operation and maintenance of MIP equipment,
hands-on operation and field exercises of the MIP equipment,
and instruction in the interpretation of data
obtained from the MIP logs.

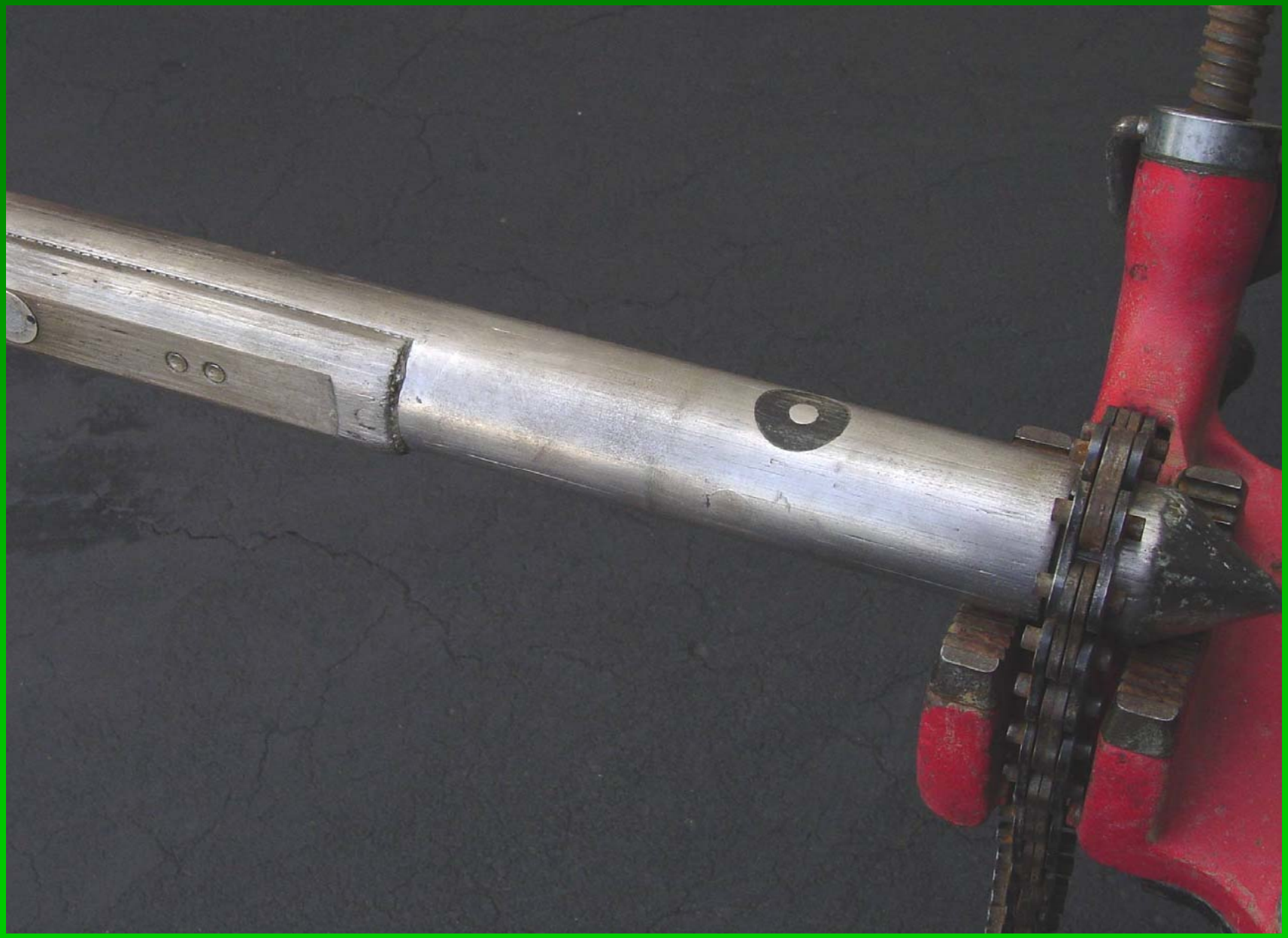
Genuine Geoprobe®

Jon Terpening
Geoprobe® Systems
November 30, 2006

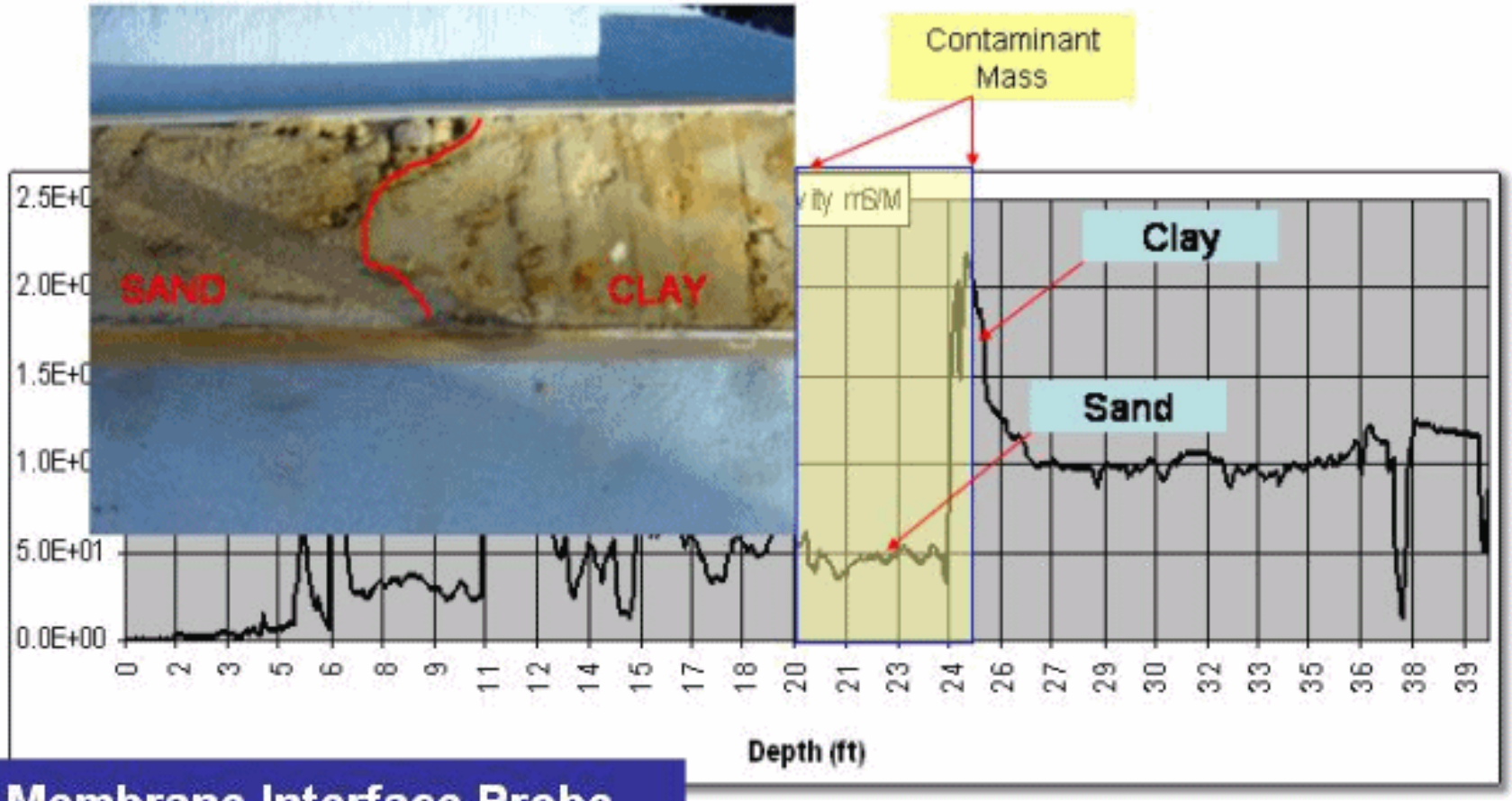
Direct Image®


GC with Detectors or
Free-standing Detectors
MIP Control Module
MIP Trunkline
Stringpot Cordset
Stringpot
Mounting Bracket
Pull Cap
Drive Cap
Wiring Cavity
MIP Probe
Stringpot Piston
Weight
Stringpot
Bottom
Clamp

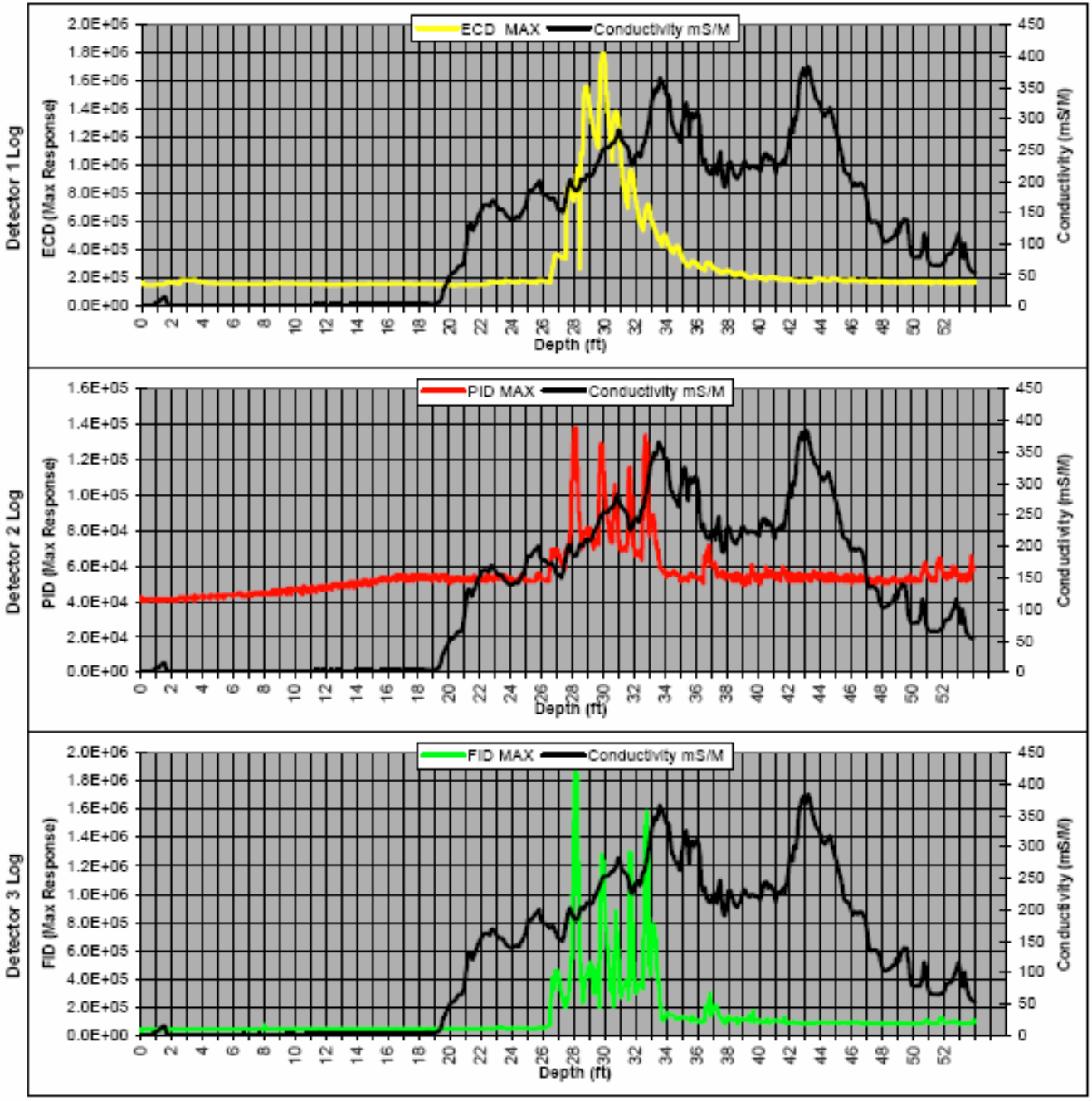


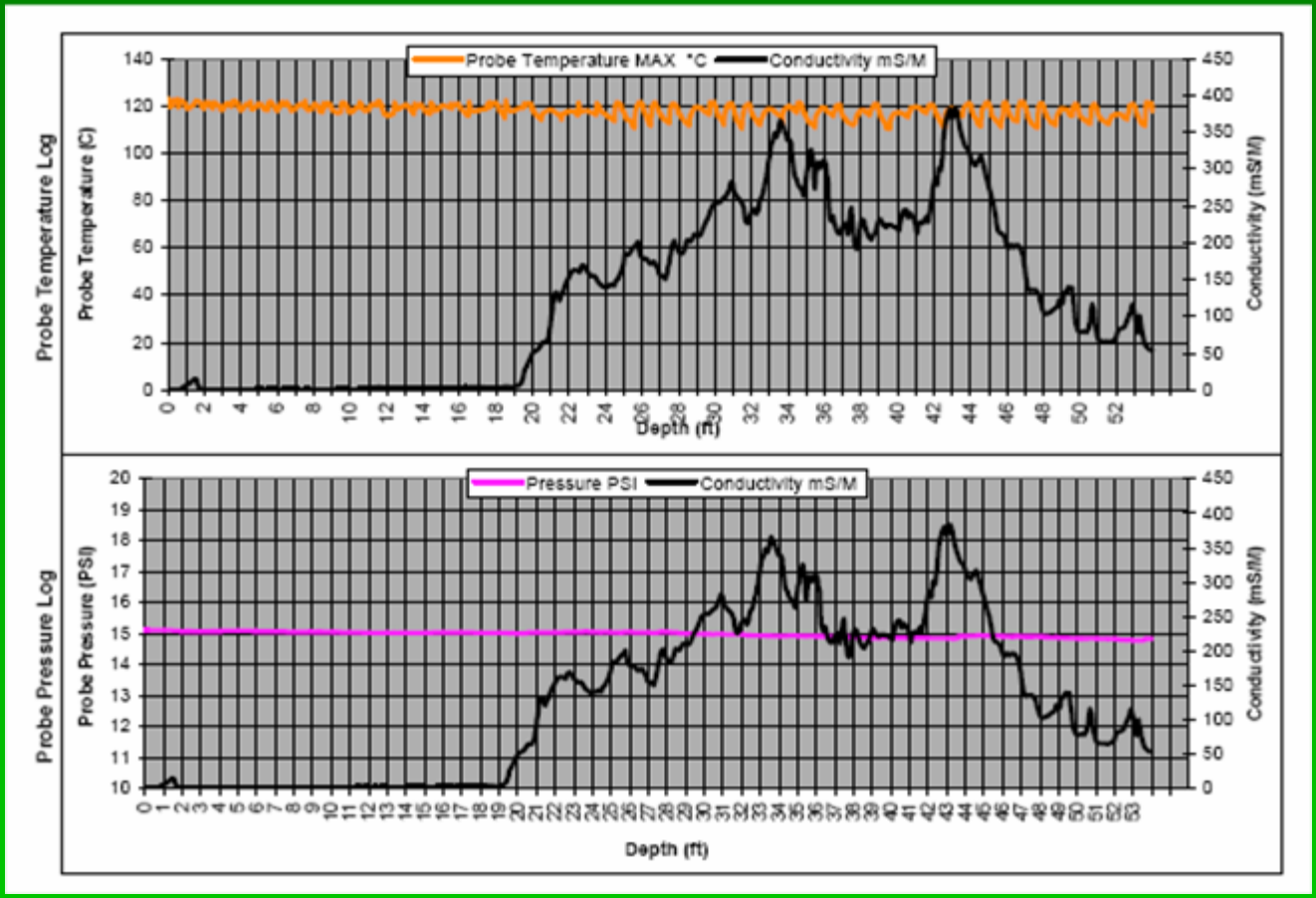


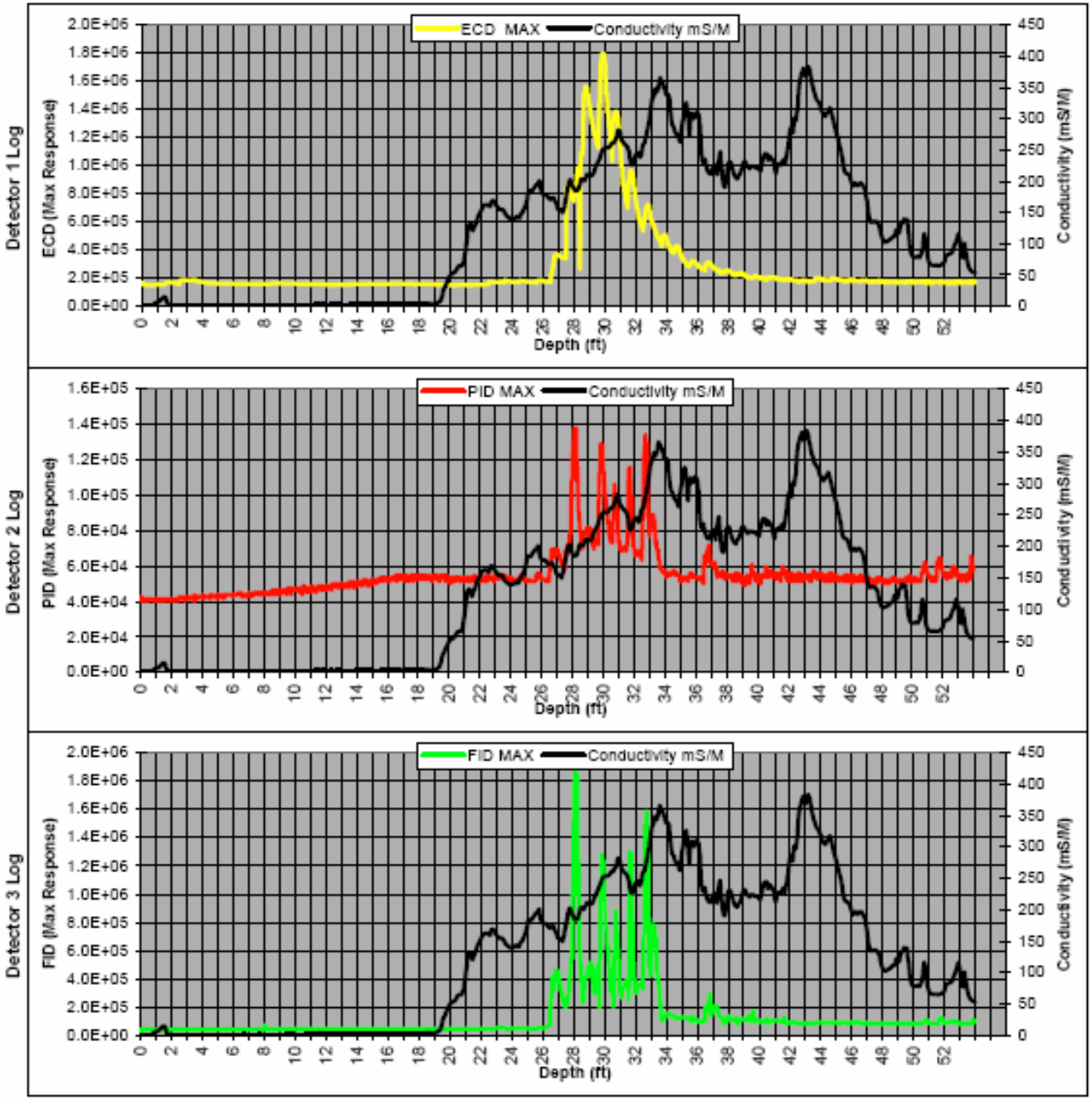
MIP Results - Lithology

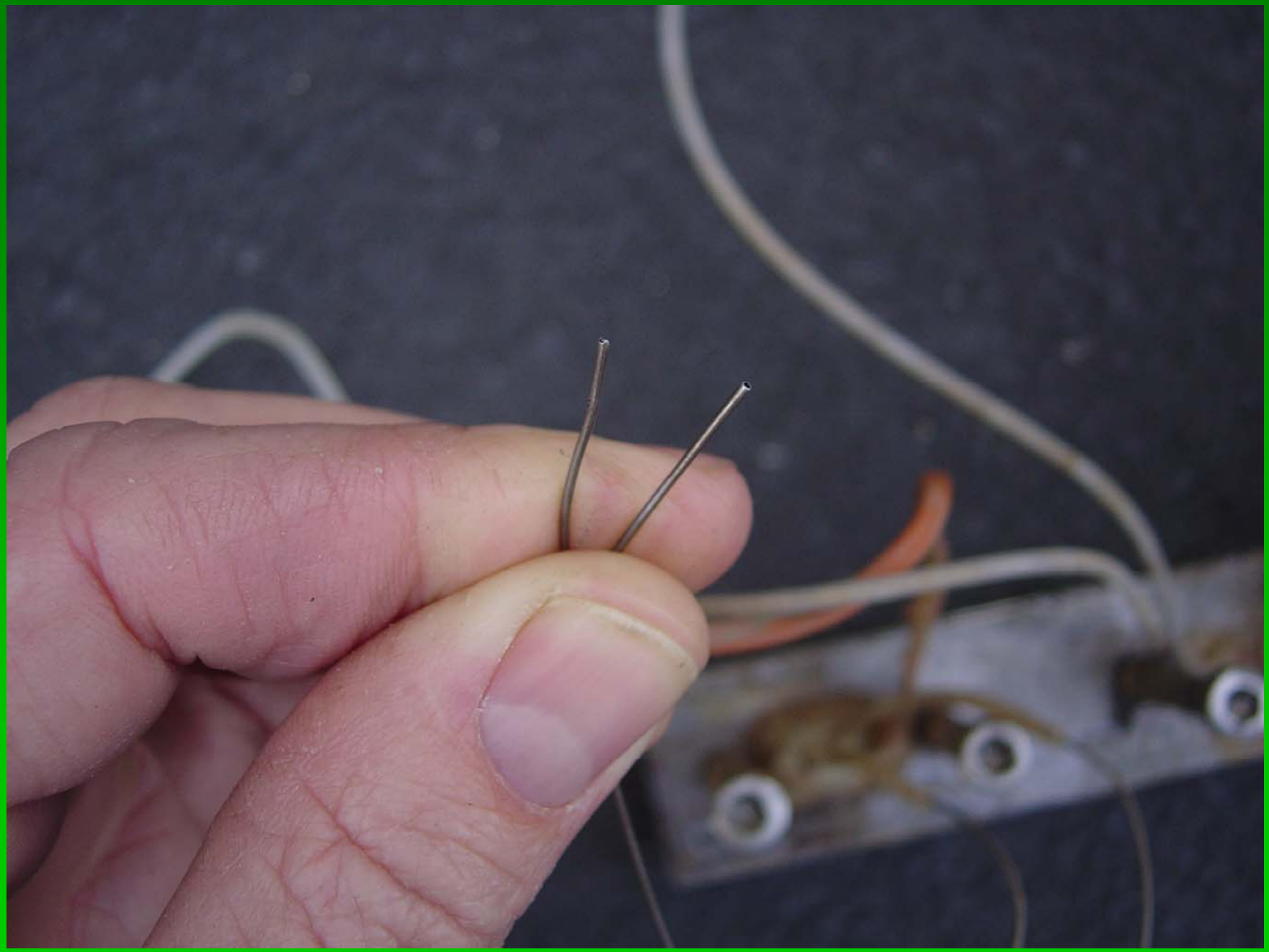


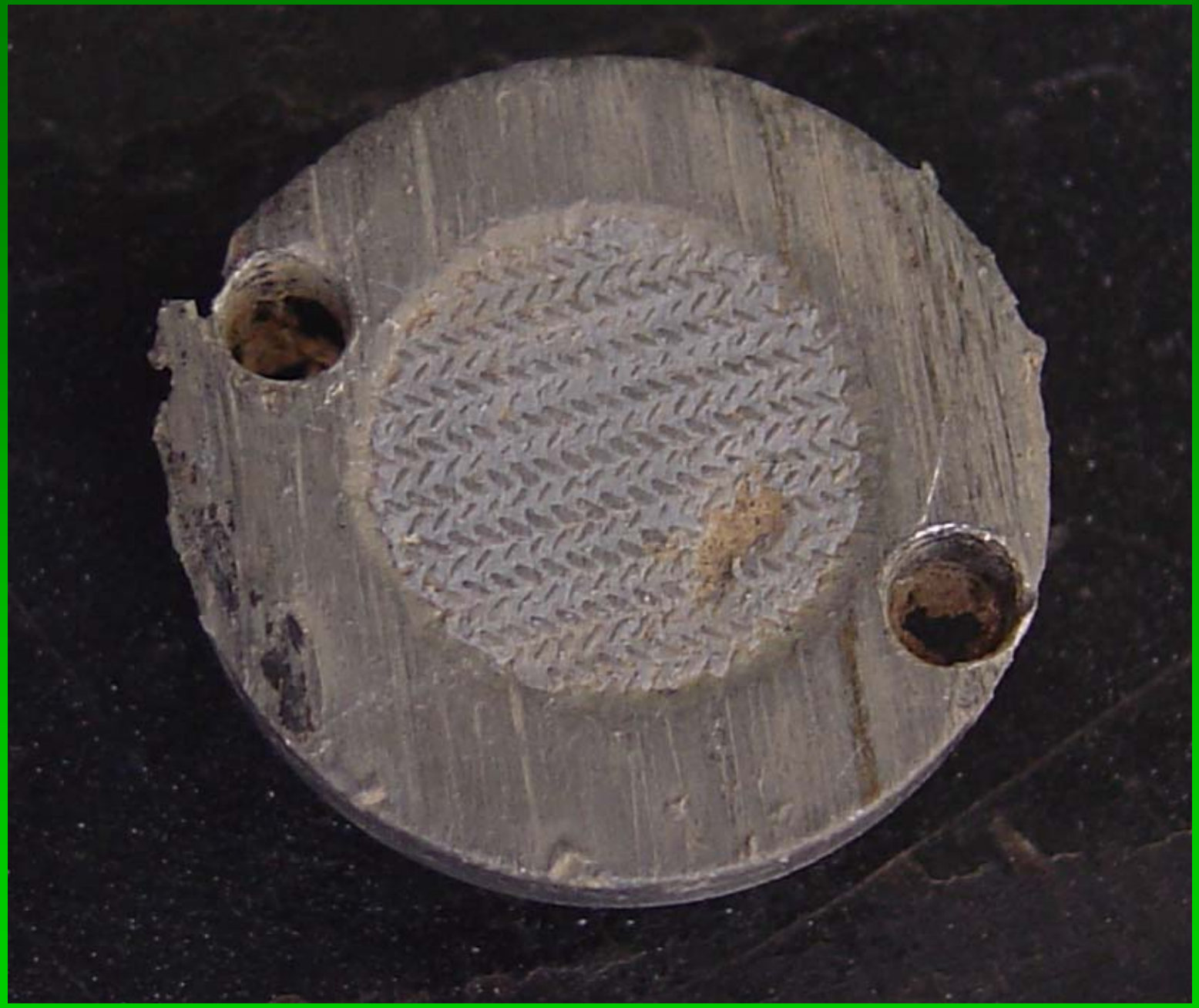
Membrane Interface Probe


Detector 1 Log
ECD MAX
Conductivity mS/M
ECD (Max Response)
Conductivity (mS/M)
Depth (ft)
Detector 2 Log
PID MAX
Conductivity mS/M
PID (Max Response)
Conductivity (mS/M)
Depth (ft)
Detector 3 Log
FID MAX
Conductivity mS/M
FID (Max Response)
Conductivity (mS/M)
Depth (ft)


Probe Temperature Log
Probe Temperature MAX °C
Conductivity mS/M
Probe Temperature (C)
Conductivity (mS/M)
Depth (ft)
Probe Pressure Log
Pressure PSI
Conductivity mS/M
Probe Pressure (PSI)
Conductivity (mS/M)
Depth (ft)


Detector 1 Log
ECD MAX
Conductivity mS/M
ECD (Max Response)
Conductivity (mS/M)
Depth (ft)
Detector 2 Log
PID MAX
Conductivity mS/M
PID (Max Response)
Conductivity (mS/M)
Depth (ft)
Detector 3 Log
FID MAX
Conductivity mS/M
FID (Max Response)
Conductivity (mS/M)
Depth (ft)





Costs

$$$

per day, 300 total feet,

VOC characterization

Geoprobe-type

push rig soil sampling

~$2000-$3000/day,

more than 1 day for 300’

CME-75

8” hollow stem auger

~$25-30/foot = $7500 - $9000

for 300’

Geoprobe

Membrane Interface Probe

~$3500-$4500/day,

one day for 300’

Geoprobe

Membrane Interface Probe

additional savings:

-Fewer installations

-Fewer sampling locations

Geoprobe

Membrane Interface Probe

additional benefits:

-Time savings

-Richer data

ASTM INTERNATIONAL
Standards Worldwide

Vironex.com

Geoprobe® Systems

Pete’s MIP checklist

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to the

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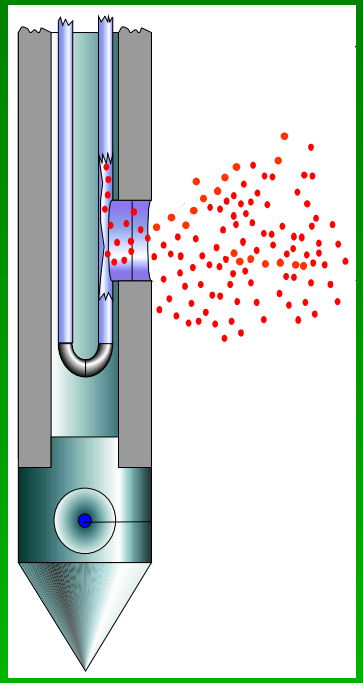

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