CASE STUDY: A SWITCH TO PASSIVE SAMPLING

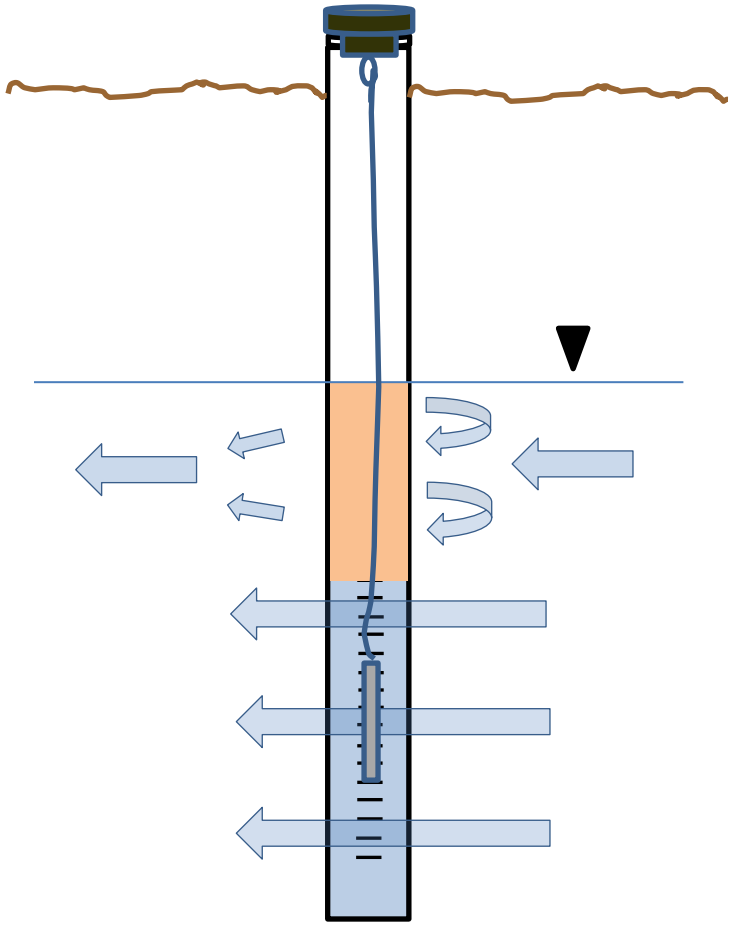
IS YOUR SITE READY?

HRP
MOVE YOUR ENVIRONMENT FORWARD

CASE STUDY OVERVIEW

- Project Management View Point
- Overview of the Science
- Advantages and Limitations – PDBs
- Stakeholder Buy-in
- Data Correlation
- Finances

What Is Passive Sampling



- Groundwater Flows & Diffuses through the Well Screen
- Sampler is Located in the Flow
- All sampling requires flow:
  - K=>5 cm/sec; or
  - v =>0.5 ft/day; or
  - i = >0.001; or
  - Yield = >100 ml/min
- Passive sampling may enable better recovery in low recharge wells.

PRO'S AND CON'S

Advantages

- Eco Friendly
- Inexpensive
- Ease of Use
- Rapid Sample Recovery
- Characterize trad-boreholes
- Average concentrations
- Remote sites
- Long-term cost savings

Limitations

- Remote sites – initially
- Compound limited
- Only characterize water flowing through the well
- Upfront additional cost

STAKEHOLDERS

- Client
- Regulator
- Other responsible Parties

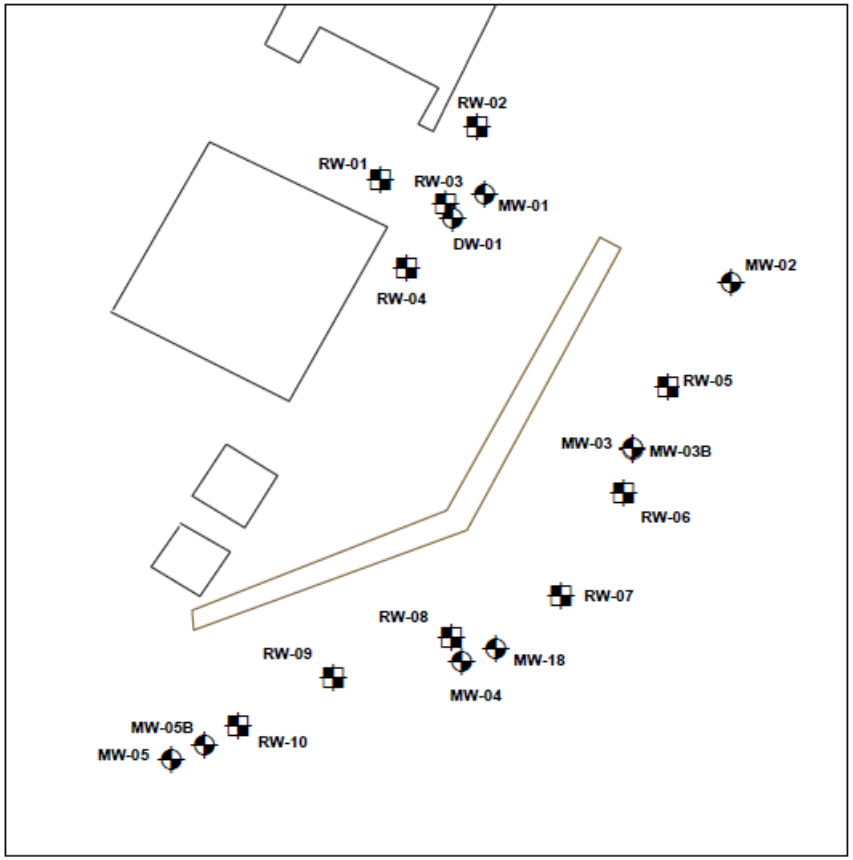
GREENVILLE, SC – CHEMICAL MANUFACTURER

- 1994 Consent Agreement with SCDHEC
- PCE groundwater plume
- MNA Remediation Strategy
- Semi-annual sampling of:
  - 8 on site monitoring wells
  - 3 off site monitoring wells
  - 6 onsite recovery wells
  - 3 surface water samples

GREENVILLE, SC – STAKEHOLDER BUY-IN

- 2011/2012 looking into alternate methods
- Oct 2012 meeting with SCDHEC
- SCDHEC required data correlation between methods
- Separate data submittal required

GREENVILLE, SC – METHODS ASSESSMENT



Remediation System/Source Area Inset

Feet
0 20 40

Location	Event	Traditional Method	Depth x Diameter	Distance from Source
MW-01	April	Bailer	26' x 2"	At Source
MW-3B	April	Peristaltic	60' x 4"	75 ft
MW-04	April	Bailer	16' x 2"	120 ft
MW-02	July	Bailer	20' x 2"	65 ft
MW-03	July	Bailer	14' x 2"	75 ft
MW-05	July	Bailer	23' x 2”	165 ft
RW-09	July	Peristaltic	25' x 4"	130 ft

Traditional samples were collected immediately after the passive sample during each event

GREENVILLE, SC – ANALYTICAL DATA

Location	Event	Total VOCs Traditional Methods (ppb)	Total VOCs PDB Method (ppb)
MW-01	April 2013	268.5	355.4
MW-3B	April 2013	<1	<1
MW-04	April 2013	<1	<1
MW-02	July 2013	21.2	38.8
MW-03	July 2013	56.5	36.2
MW-05	July 2013	31.7	6.9
RW-09	July 2013	91.2	67.5

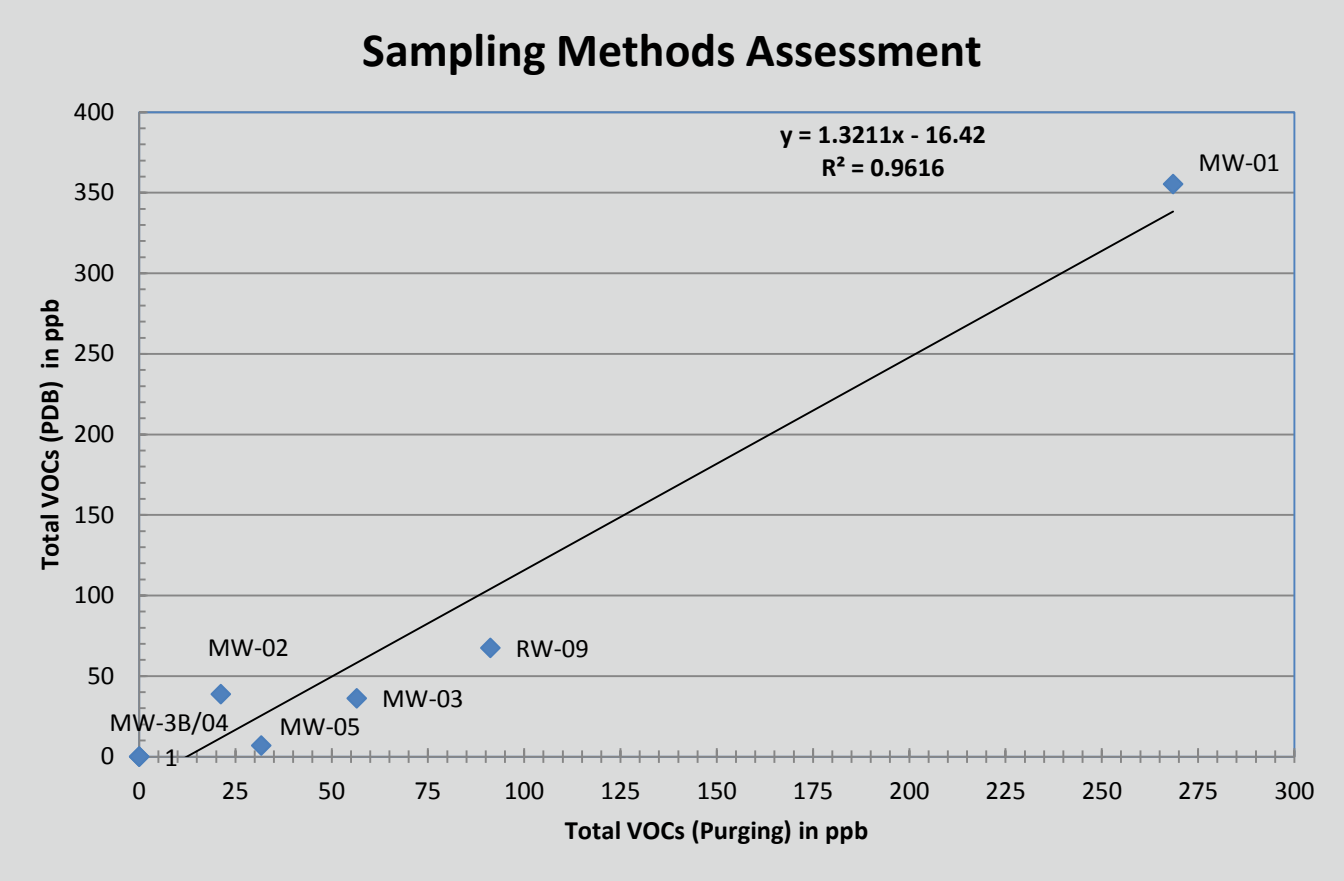
- 6 wells were consistent with historic trends
- All the results were within the same order of magnitude
- MW-04 “ND” – unexpected

GREENVILLE, SC – STATISTICAL EVALUATION

- SD = 7.8 to 12.9, except MW-01
- CI (95%) = 10.8 to 17.9, except MW-01
- MW-01 expected larger variability
- MW-01 still an order of magnitude less than concentrations

Location	Total VOCs Traditional Method (ppb)	Total VOCs PDB Method (ppb)	Mean	SD (ppb)	CI (95%)
MW-01	268.5	354.4	311.5	43.0	59.5
MW-3B	<1	<1	Not Analyzed		
MW-04	<1	<1	Not Analyzed		
MW-02	21.2	36.8	29	7.8	10.8
MW-03	56.5	35.2	45.9	10.7	14.8
MW-05	31.7	5.9	18.8	12.9	17.9
RW-09	91.2	67.5	79.4	11.9	16.4

GREENVILLE, SC – LINEAR REGRESSION MODEL



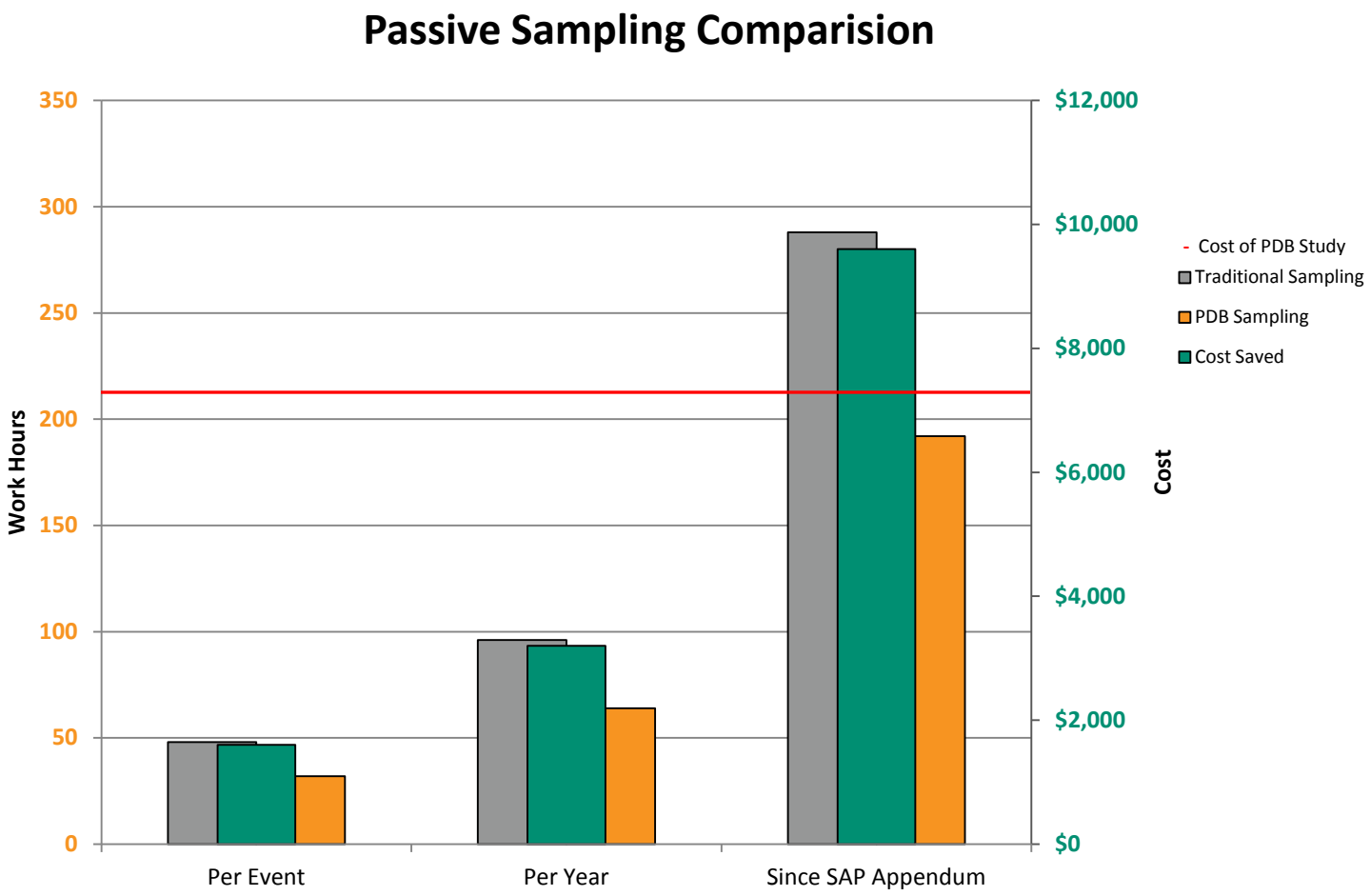
- Slope = 1.32
- R^2 = 0.96
- PCC = 0.98

GREENVILLE, SC – CASE STUDY CONCLUSIONS

1. Analytical results – similar ppb between methods, demonstrated by SD and CI (95%)
2. Statistical variation at MW-01 was expected due to source well
3. Strong correlation between methods – R^2 and PCC
4. Non-detect values at wells were consistent per method
5. A trend was not observed between methods
6. Minimal variability between methods
7. Variability will always be observed within a natural setting

RESULT = SAP Addendum implemented for the October 2013 sampling event

GREENVILLE, SC – PROJECT FINANCES



THANK YOU.

Scott Anderson, P.G.
Project Manager
HRP Associates, Inc.
4514 Oak Fair Boulevard, Suite 143
Tampa, FL 33610
(404)-731-8845
scott.anderson@hrpassociates.com