PERFORMANCE MONITORING USING PDB SAMPLERS AT THE SOMERSWORTH SUPERFUND SITE

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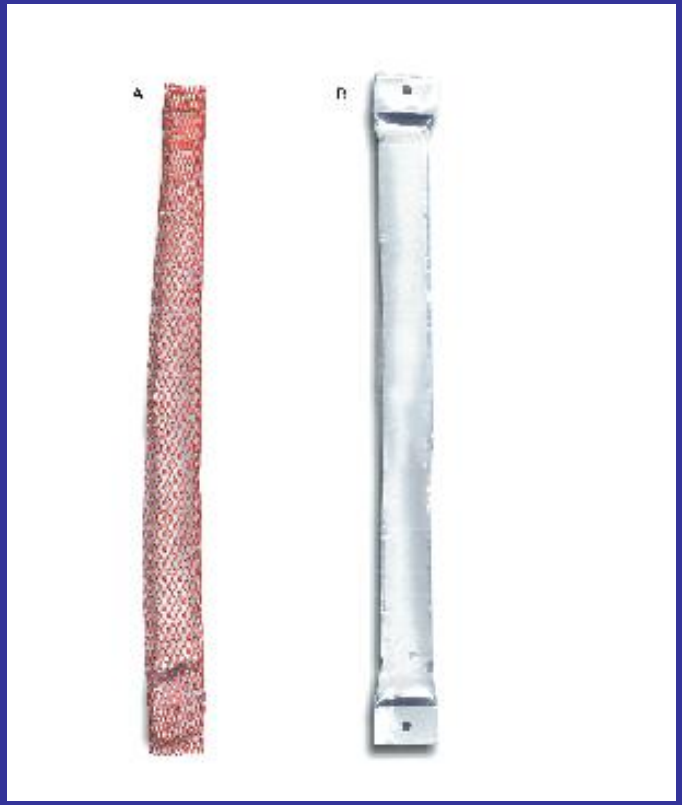
GeoSyntec

Overview

- Passive Diffusion Samplers (PDBs) – what are they and how do they work?
- Application of PDBs at Somersworth Landfill Superfund Site
- Comparison of Purge & PDB Data

Typical PDB sampler consists of:

- deionized water in a low density polyethylene (LDPE) sleeve
- 1 to 2 feet long
- diameter about 1.2 inches
- LDPE mesh bag may be used for protection



PDB Sampler

- PDB holder that consists of stainless steel weighted reusable line or fixed length pipe
- VOCs in well water diffuse through LDPE
- Concentration in PDB equals concentration in well

Advantages of Using PDB Samplers

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- Sediment cannot pass through the small pore size in the LDPE (10 angstrom or less)

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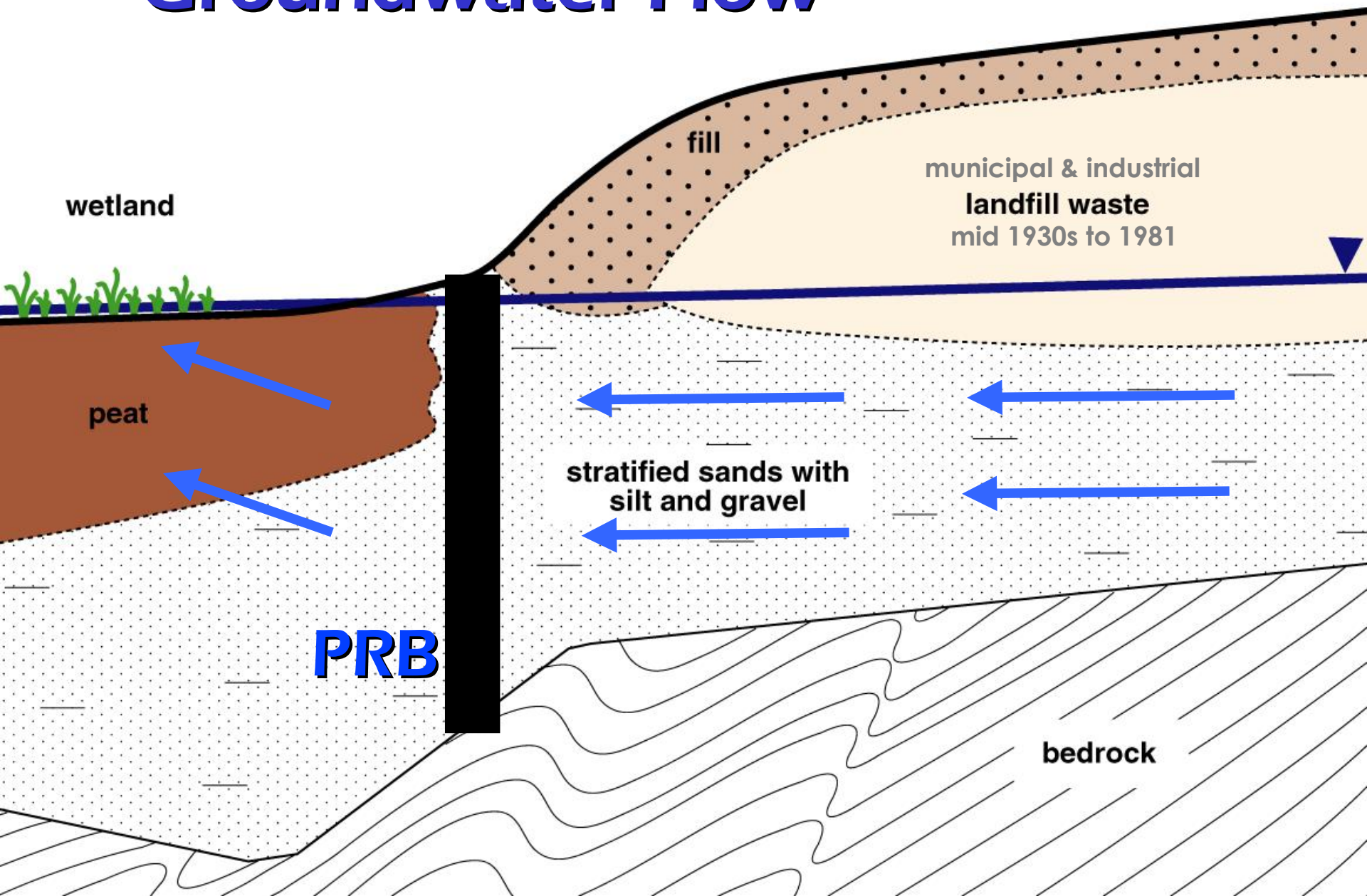
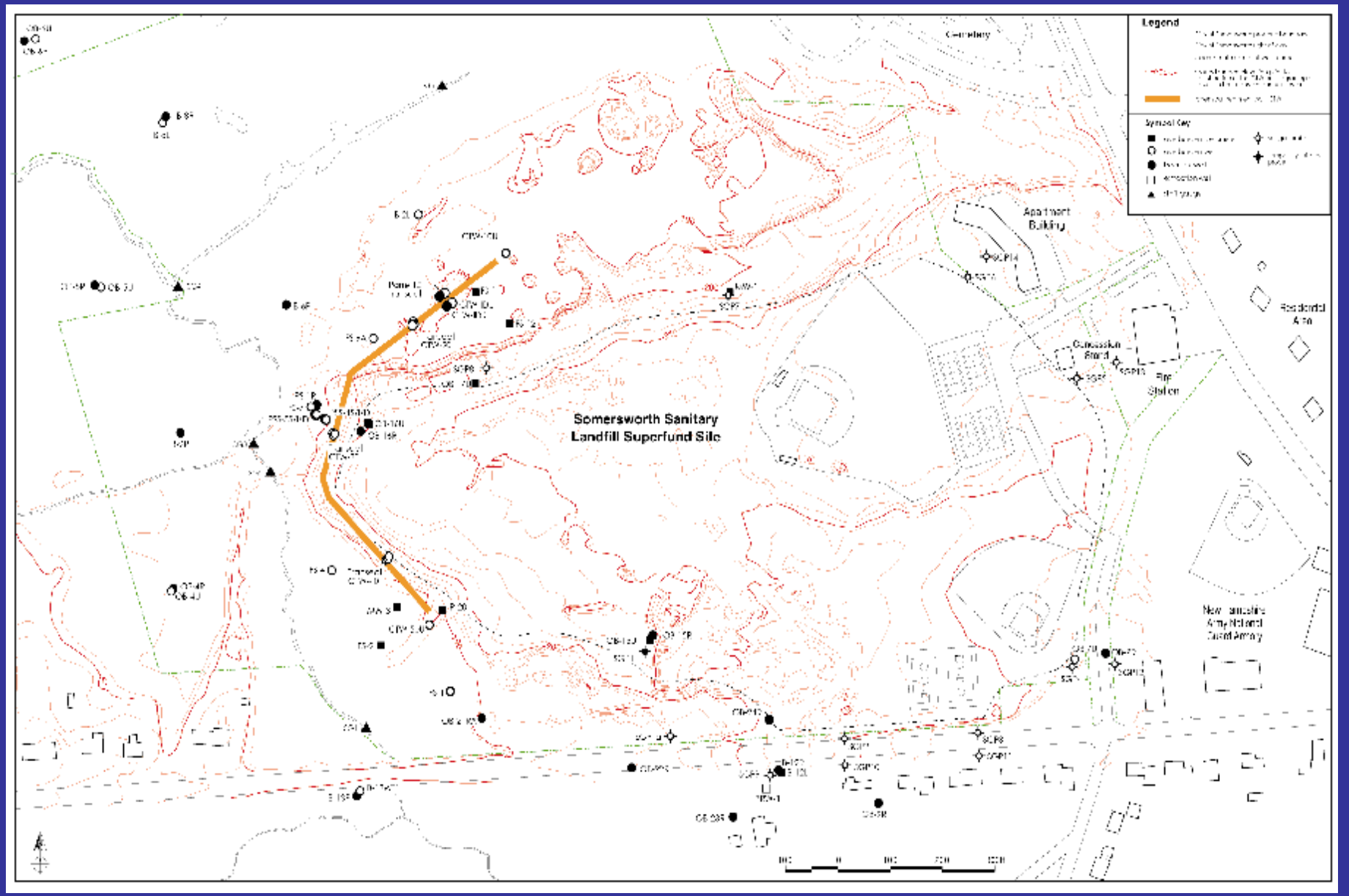
- PDB samplers rely on the free movement of water through the well screen.
- Chemical stratification or vertical flow in the borehole may make a single PDB sampler inappropriate.

PRB to Intercept Natural Groundwater Flow




Somersworth Sanitary
Landfill Superfund Site
Legend
Symbol Key
Apartment
Building
Residential
Area
Concession
Stand
Fire
Station
New Hampshire
Army National
Guard Armory
Cemetery

Site-Specific Factors Influencing Decision to Use PDBs

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Site-Specific Factors Influencing Decision to Use PDBs

- groundwater sampling at 30 monitoring wells for VOCs only 3-times annually for several decades
- 2-inch wells
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- Most wells are 2-inch wells
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- Site RPs and EPA supportive of PDB use at this Site
- Cost advantage !!!

Cost Advantages & Implications:

COST SAVINGS PER SAMPLING EVENT

- >$250 per well per event is saved using PDBs
- 30 wells sampled per event represents a cost savings of >$8K per event
- Annual savings of about $25K
- Excludes savings from purge water disposal

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TECHNOLOGY IMPLEMENTATION COSTS

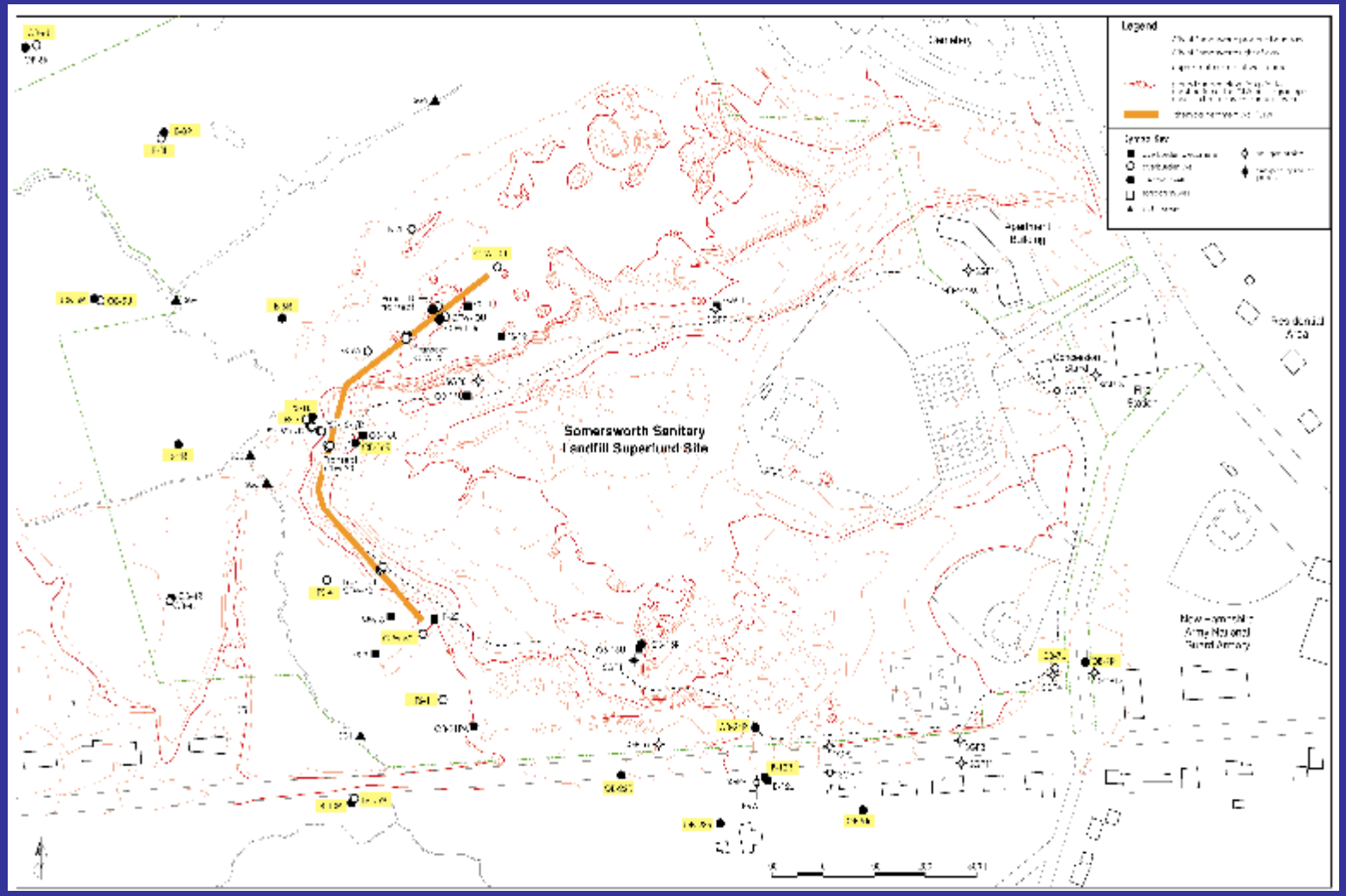
- up front costs of $18K, recovered in <3 events:
  - $3K for PDB holders (about $100 per well labor & materials)
  - $15K for “comparison study”

Cost Advantages & Implications:

PROOF OF CONCEPT

- Purge sample - PDB comparison study at 23 of the 30 wells
- Deploy PDBs for 14 days, collect, then purge and sample well
- Use method that provides the highest VOC concentration

Purge vs PDB Comparison

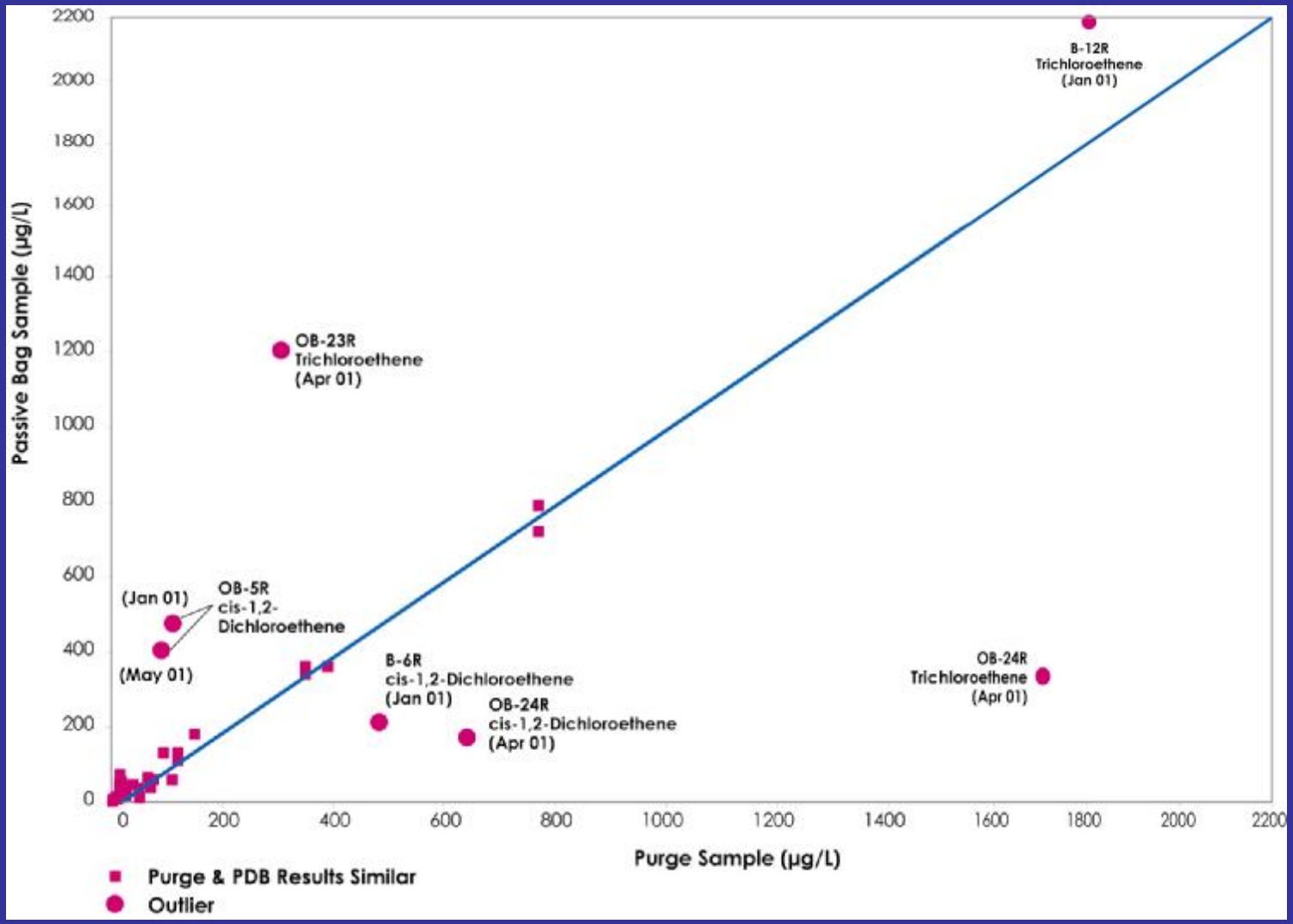


Statistical Comparison of Passive Diffusion Bag Sampling & Purge Sampling

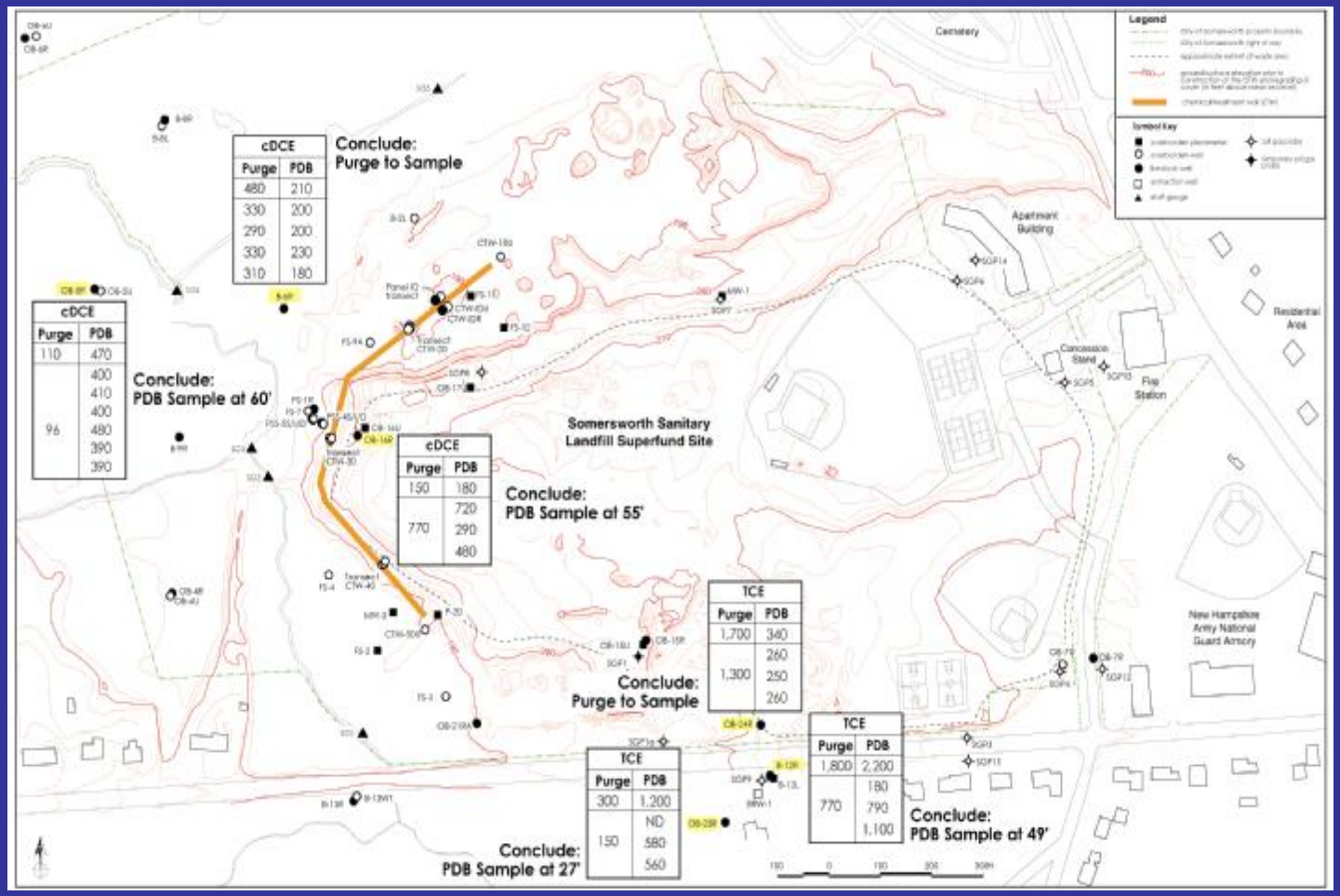
- The sample pair data points were subdivided into five categories on the basis of VOC detection

	No. of Data Points	Compound
Both Non-Detect	202	-
Paired Data	51	-
False Positive	2	cDCE, TCE
False Negative	2	TCE, VC
Outliers	6	cDCE, TCE
Total	256	-

Purge Sample vs PDB



Depth-Specific Sampling



Conclusions

- PDB samplers produce results that compare very well to those collected using conventional purging techniques.
- Of the 23 wells tested, only 6 wells had significant discrepancies, but only 2 of these wells (bedrock wells with long screens) had purge sample results significantly greater than PDB results.
- Of the 30 wells in which only VOCs are monitored, 28 are now being sampled with PDBs.
- PDB samplers with 14 day deployment being used successfully to demonstrate performance of the ZVI PRB at this landfill