A Single Calibration for Waters and Soil Samples Performing EPA Method 8260

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Abstract

A Single Calibration Method for Water AND Soil Samples

The United States Environmental Protection Agency (USEPA) Method 8260 is used to determine Volatile Organic Compounds (VOCs) in a variety of matrices. These matrices can vary from water to soil to sludge. In order to determine VOCs in the assorted matrices, the sampling and analysis system should be calibrated as closely to the matrix as possible. This poster will discuss automated water sampling using the soil sampling station of the autosampler thus eliminating the need to have separate calibrations for waters and soils.

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Background

- In order to perform this method, you should check with your auditor to ensure it is approved.

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Instrumentation

- Sampling Technique is Patented (#8,850,905 B2)
- Requires a syringe option
- Requires a software upgrade

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NELAC Requirements For 8260 Samples

- The calibration must match the sample matrix.
- Sample matrix changes in the 12 hour tune window require an added three samples in order to meet NELAC requirements.

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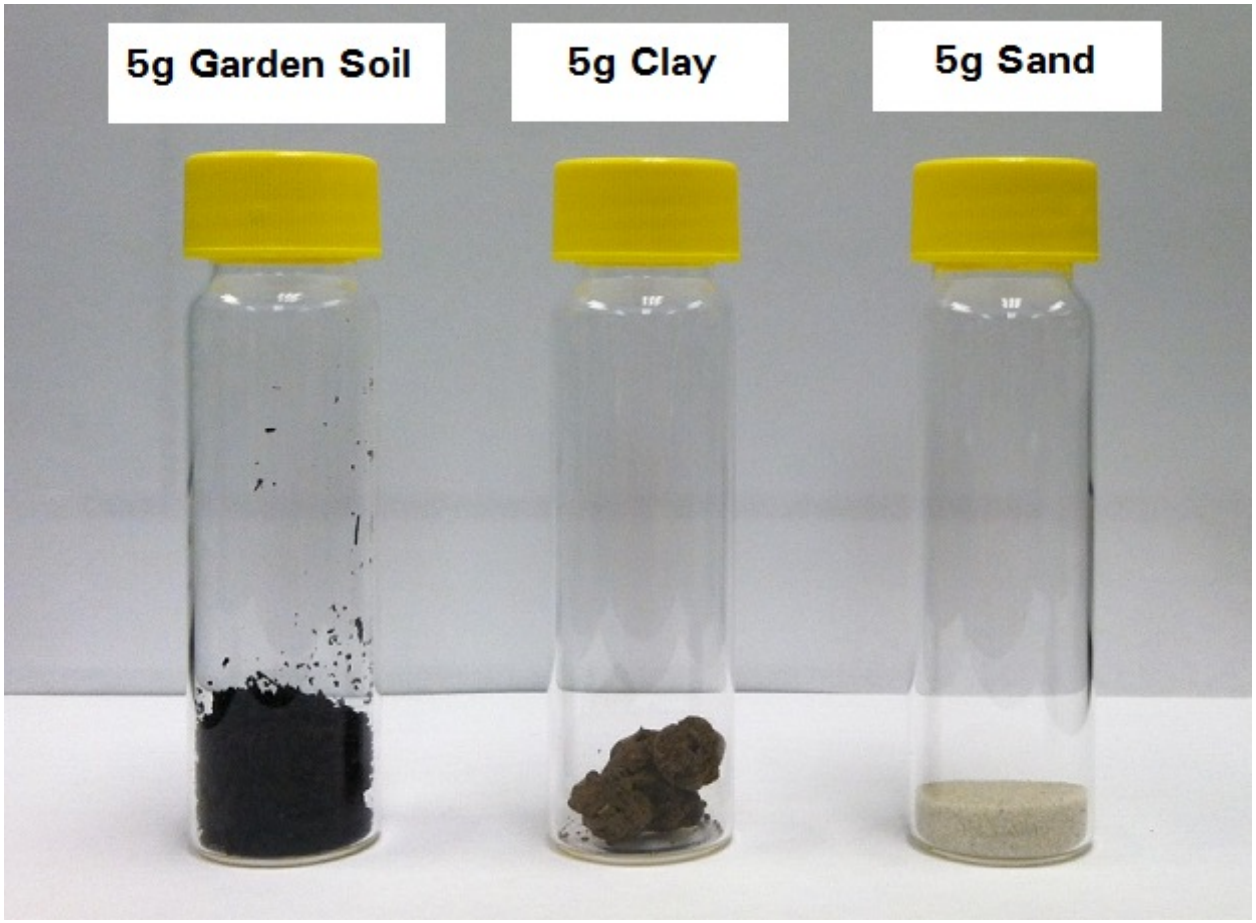
Soil Matrices



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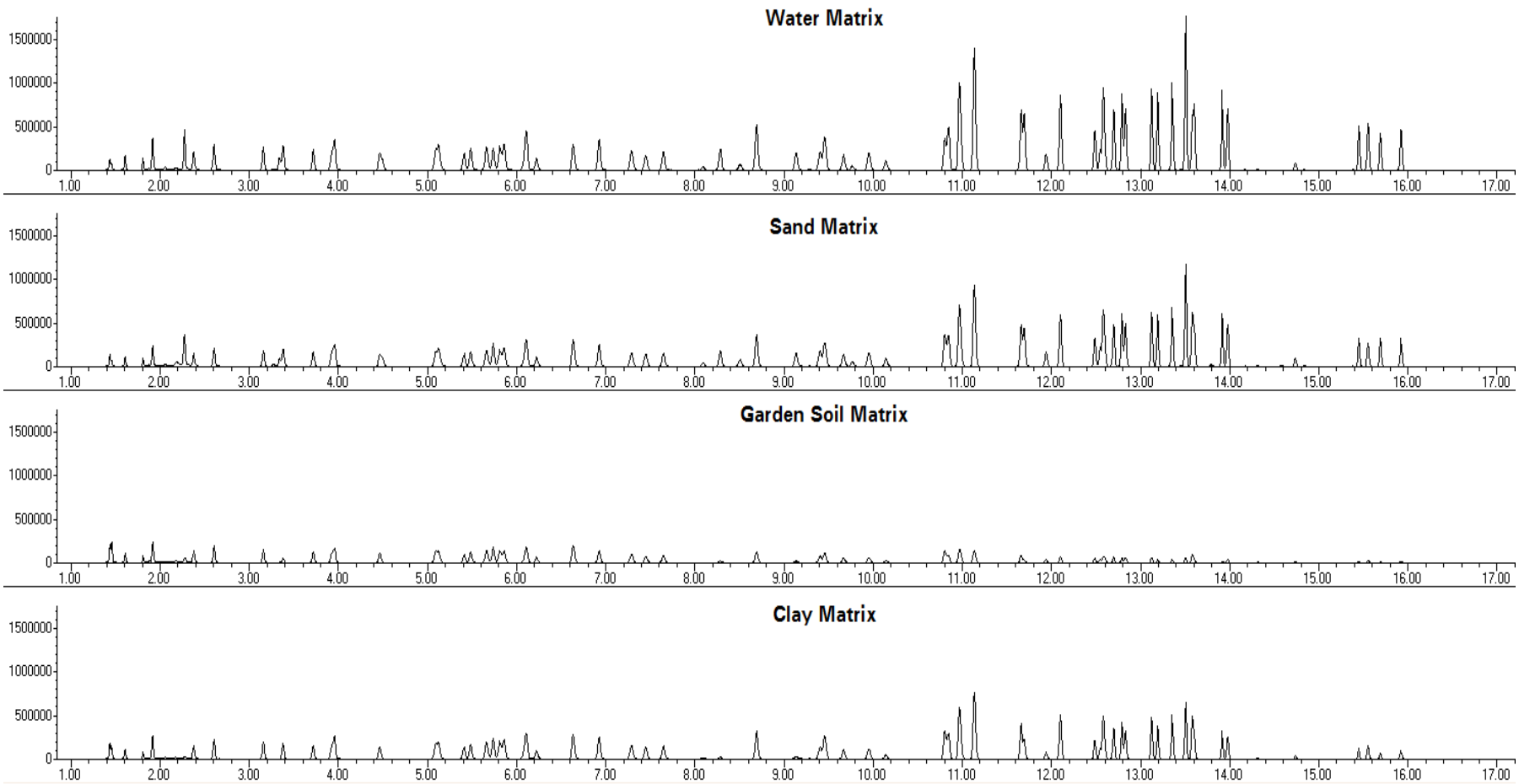
Matrix Comparison



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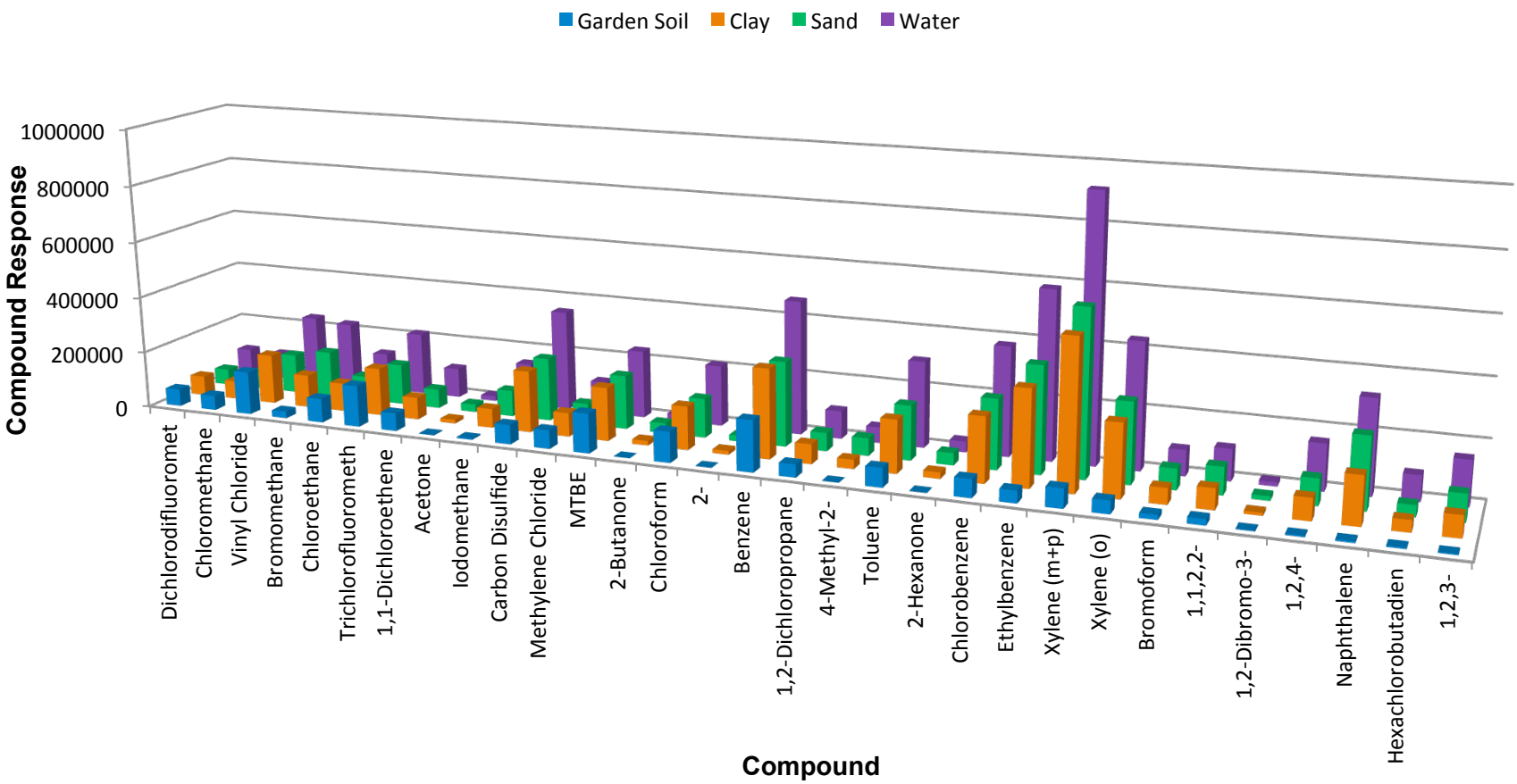
Compound Response Summary



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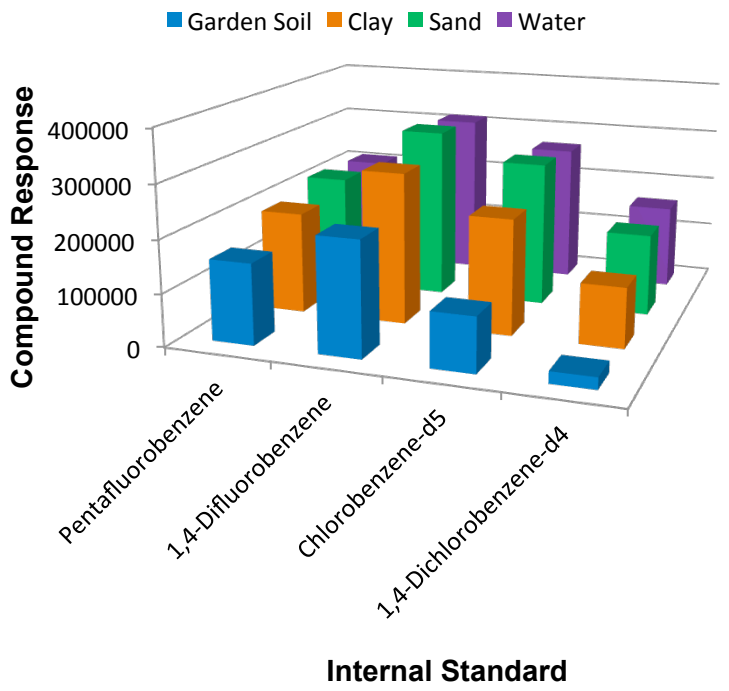
Internal Standard Response Comparison

Garden Soil	Clay	Sand	Water
153811	193785	216722	209649
217608	288693	326783	313067
103410	220488	277863	265293
22425	114541	156039	159997



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Environmental Lab Sequence

- Bromofluorobenzene (BFB) tune standard
- Calibration Standard
- Laboratory control standard
- Matrix blank

All must pass inspection every 12 hours.

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Time Saving Techniques

- Decrease bake times
- Purge time and flow rates
- Dual Sampling systems

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Reduce Calibrations

- One of the most basic ways to save time and money is by reducing the number of required curves and standards needed.

- EST has designed a patented automated water sampling mode that will allow environmental labs to run water samples in soil mode. Thus, water and soil curves, standards, blanks and samples can use the same sampling parameters.

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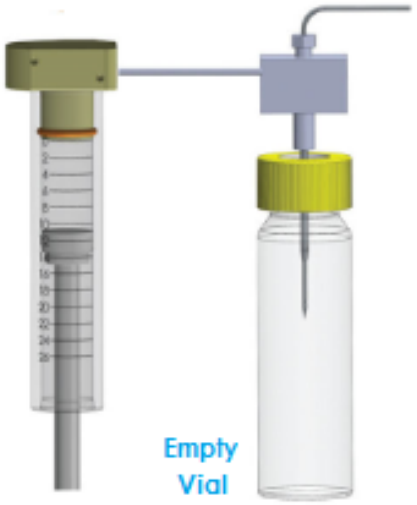
Step 1



- Empty vials are placed in one tray while water standards or samples are placed in the second tray.
- The system transports the empty vial to the soil sampling station and it is moved onto the sample needle

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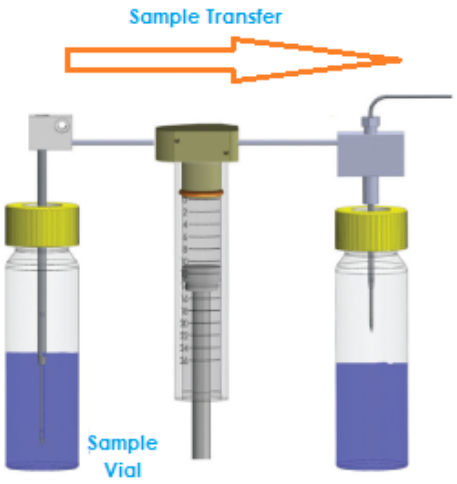
Step 2



- The arm moves over to the full water vial, the vial is pressurized with helium gas and the prescribed water volume is removed.
- Internal standard (IS) is added by injecting IS into the sample as it is transported to the vial in the soil sampling station.
- The sampling system is closed the entire time thus ensuring the integrity of the sample.

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Step 3

- The sample is heated and purged in the same manner as a soil sample, and the analytes are trapped on the analytical trap. Next, the analytes are desorbed onto the GC column.

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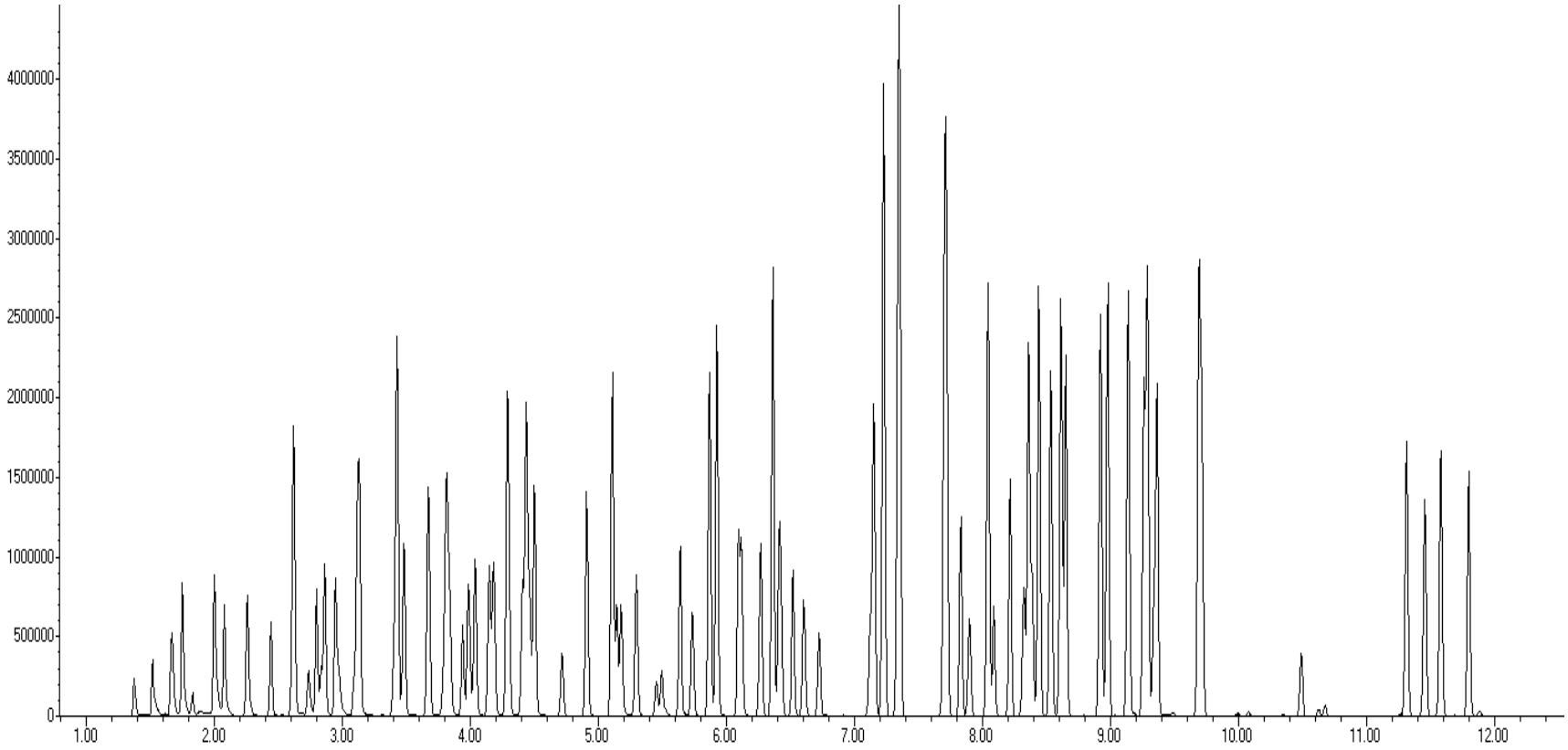
50ppb Chromatogram of a Water Sample Run in Soil Mode



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System Performance Check Compounds (SPCC) Results

Compound	8260 RF Requirement	Curve %RSD	Curve Ave. RF	MDL	Precision (%RSD 50ppb)	Accuracy Ave. 50ppb Recovery
Chloromethane	0.10	9.74	1.436	0.12	2.12	100.67
1.1-Dichloroethane	0.10	7.70	1.497	0.10	1.94	105.28
Bromoform	0.10	12.14	0.348	0.11	1.90	112.12
Chlorobenzene	0.30	6.12	1.409	0.11	0.99	103.75
1,1,2,2-Tetrachloroethane	0.30	6.76	0.990	0.07	2.55	100.40

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Calibration Check Compounds (CCC) Results

Compound	8260 Accuracy Requirement	Curve %RSD	Curve Ave. RF	MDL	Precision (%RSD 50ppb)	Accuracy Ave. 50ppb Recovery
1,1-Dichloroethene	± 20%	4.26	0.68	0.10	2.02	102.43
Chloroform	± 20%	4.79	1.455	0.18	1.57	104.32
1,2-Dichloropropane	± 20%	10.27	0.544	0.11	1.25	105.25
Toluene	± 20%	8.60	1.383	0.09	0.94	110.91
Ethylbenzene	± 20%	8.85	2.499	0.12	1.10	110.51
Vinyl Chloride	± 20%	8.59	1.529	0.09	1.41	112.97

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Conclusions

The patented sampling process proved to be a reliable and accurate sampling method for running water samples in the soil mode. The curve linearity and method detection limits both met USEPA Method 8260 requirements, and the precision and accuracy results were excellent. The water extraction technique will save laboratories time and money because only one set of standards, curves, etc. is required for both water and soil samples.

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Questions?

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