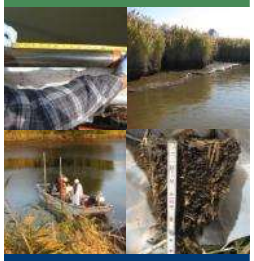

Quality Assurance/Quality Control Considerations With Regard to the Use of Passive Sampling Devices/Materials

J.K Caprio

Geosyntec Consultants Inc.

NEMC 2016

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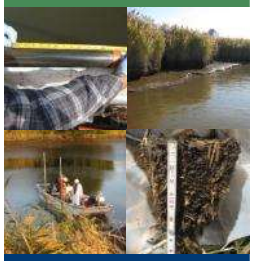

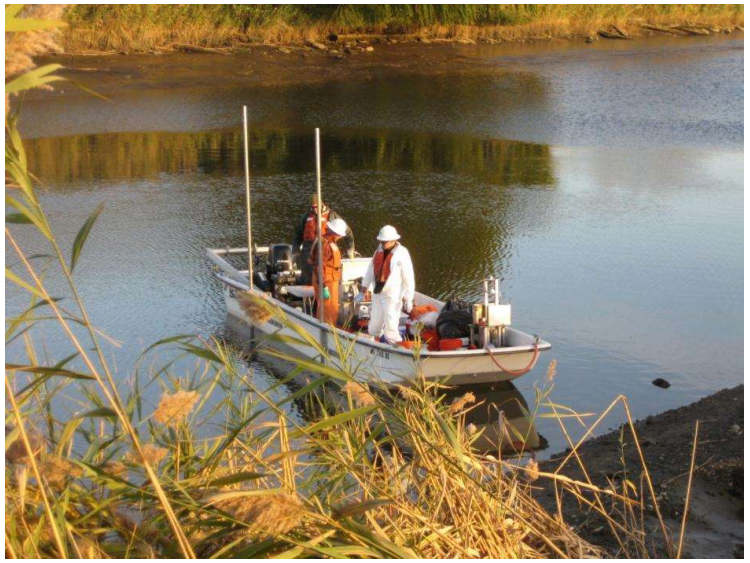

Data Quality

Defensible, Transparent, Known Quality

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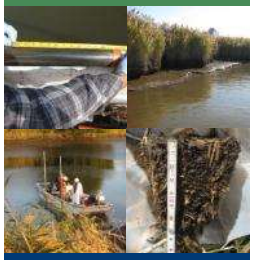

Passive Sampling Devices Related to Sediment Sampling

- Used for sediment pore water characterization.
- Used for sediment pore water for toxicity studies.
- Passive devices are often "manufactured" by the user but may be purchased from a supplier.
- Variability between sampling device performance is a real concern.

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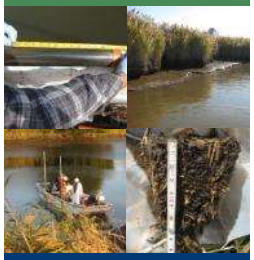
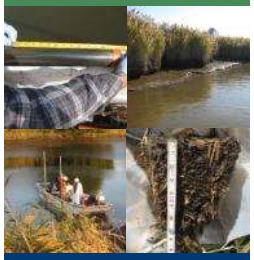


Data Quality - Defensibility

- Passive Sampling is becoming more acceptable by regulatory agencies.
- However - there is not an "approved method" for the overall use of passive sampling devices i.e. extraction and analysis.
- For maximum defensibility of the data it is very important to obtain your passive sampling supplies from a reputable vendor.
- If you are creating your own passive sampling devices – obtain your base materials from a reputable vendor.
- For maximum defensibility of the data it is very important to use a certified commercial lab – certified for the analytical method passive sample collection and extraction are being used for.
- If the analysis you are performing cannot be performed by a certified laboratory ensure that the laboratory you use follows industry standard quality control protocols with regard to analysis and documentation.



Data Quality – Systematic Planning

- Write the sampling protocol into your project documents i.e. Quality Assurance Project Plan (QAPP) and/or Field Sampling Plan.
- Write the analytical protocols into your QAPP or work plan.
- Depending on the regulatory environment, have the regulating agency sign off on your project planning documents as applicable.

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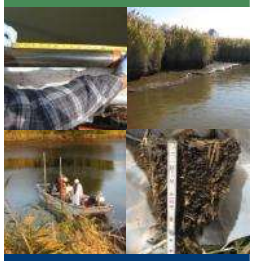

Supplier Quality

Its not just about the analytical!

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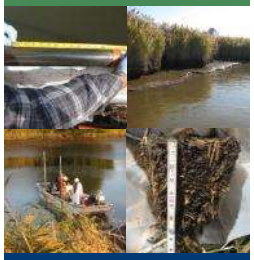

Sampling Material Quality Control Measures

- The sampling material must be shown to be consistently prepared and contaminant free. This is achieved by:
  - Purchasing supplies from a known manufacturer
    - ISO 13485, ISO 9001, and ISO 14001 certified
    - Strong Quality Control system in place
    - Measured metrics for quality control; e.g. for polydimethylsiloxane (PDMS) rods:
      - Rod Diameter
      - Coating diameter

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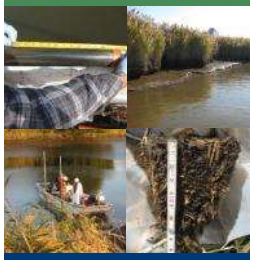

Vendor Quality Documentation

Polymicro TECHNOLOGIES
A Subsidiary of molex

1068020024
FSS1000106

ANBS01A						ANBV01A					
Glass Dia.- Beg	Coat #1 Dia.- Beg	Coat #1 Min.- Beg	Coat #1 Max.- Beg	Glass Dia.- End	Coat #1 Dia.- End	Glass Dia.- Beg	Coat #1 Dia.- Beg	Coat #1 Min.- Beg	Coat #1 Max.- Beg	Glass Dia.- End	Coat #1 Dia.- End
µm	µm	µm	µm	µm	µm	µm	µm	µm	µm	µm	µm
1001.5	1060.6	28.8	31.4	998.9	1067	997	1041	21	21	1009.4	1056

	Average
Glass Diameter	1000.2
Coating Diameter	1063.8
Thickness	31.8

	Average
Glass Diameter	1003.2
Coating Diameter	1048.5
Thickness	22.65

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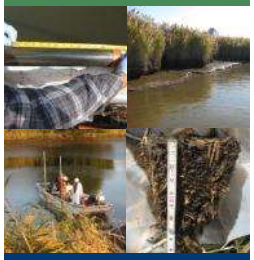

Contaminant Free….

- The supplier will not always verify materials are contaminant free.
- They should verify production of materials under “clean” conditions.
- It’s up to the user to ensure the sampling substrate is “clean” for the analyte of interest.

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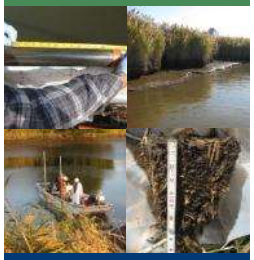

Perform lot checks

- In some cases the supplier will provide documentation of lot checks for the analyte(s) of concern.
- However, the burden is on the user.
- Assemble the passive sampling device and submit to the laboratory for extraction and analysis for the analyte(s) of concern prior to field deployment.
- Results should come back less than the analyte reporting limit.

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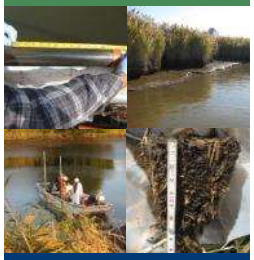
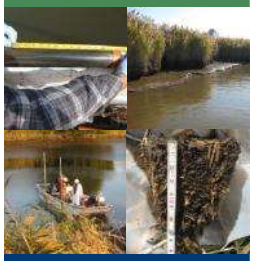


"Clean" Substrate Example

- Lot checks for PCB Aroclor sampling and analysis:
  - Rods are washed with milli-Q DI water and placed in hexane (pesticide grade) typically for 24 hours but at a minimum for 30 minutes then allowed to air dry in a fume hood.
  - Cages are washed in Sparklene and rinsed with hexane – 3 times and then rinsed with water and allowed to dry in a fume hood.
  - Sampler blanks are then analyzed to ensure no contamination is present on the rods prior to use.
  - Lot checks should be documented.



Field Quality Control

If its wrong here, its wrong everywhere…

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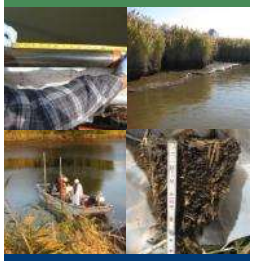

Field Quality Control

- Documentation – without proper documentation the sample never existed….
- Keep sampling devices protected from breakage and contamination prior to field deployment.
- Use decontaminated cages to shield the sampling devices where necessary.
- Use performance reference standards to determine equilibration.
- Document and clearly mark location, time and date of deployment. (Percent completion for a project includes number of sampling locations.)
- Use a unique sample identification system that gives an indication of location, matrix, and depth of sampling location.
- Field QC samples can include field duplicates (side by side?) and matrix spike/matrix spike duplicate samples*.
- Sample extraction often begins in the field as the devices are removed from the sample matrix, rinsed with analyte free water and placed in laboratory supplied bottles containing pesticide grade solvents.
- Ship samples under the appropriate preservation requirements as applicable.
- Ship samples under a chain-of-custody (COC) for maximum defensibilty. Make sure to fully complete and sign the COC.

*MS/MSD samples may or may not be feasible depending on the device and application.

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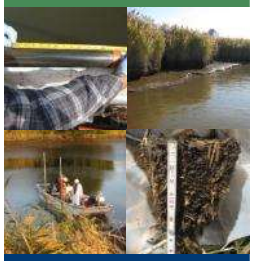

Analytical Data

And Associated Laboratory Quality Control Checks and Practices

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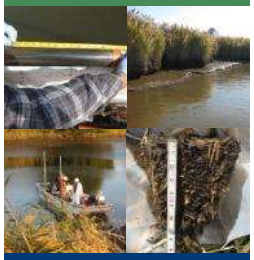

Laboratory Communication

- Since passive sampling and extraction are not guided by an "approved" standard method, finding and communicating with a certified laboratory with the expertise and "willingness" to perform the extraction and analysis to specifications is strongly advised.
- Communicate all analytical requirements to the lab prior to selection – in writing.
- Require the laboratory to respond in writing to confirm that they can meet the requirements for the project and for the method.

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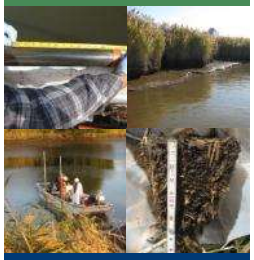

Confirmation of:

- Turn around time;
- Data package requirements;
- Reporting limits and method detection limits;
- Compound list requirements;
- Reporting specifications i.e. primary aroclor, primary and secondary aroclor, potential for elevated reporting limits, etc.;
- Reporting units i.e. mass units versus concentration units (understand the math);
- Expected associated quality control samples; and
- Price!

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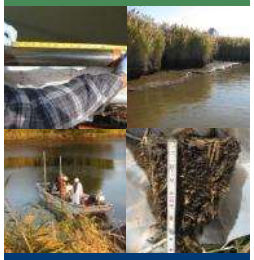
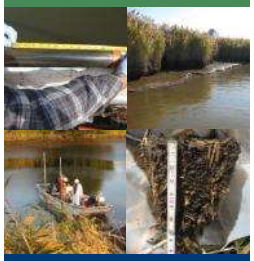


Quality Control Requirements

- Instrument calibration and continuing calibration per the specifications of the certified analytical method;
- The use of surrogates to track individual sample recovery and for from extraction as applicable (or feasible) to the analysis;
- Laboratory control samples performed using the passive sampling device so that recovery and potential analytical peak distortion is recognized and accounted for;
- Method blanks using the passive sampling devices to ensure that they do not contribute contamination or interferences; and,
- Method detection limit studies that verify the low level reported method detection limits for each analyte.

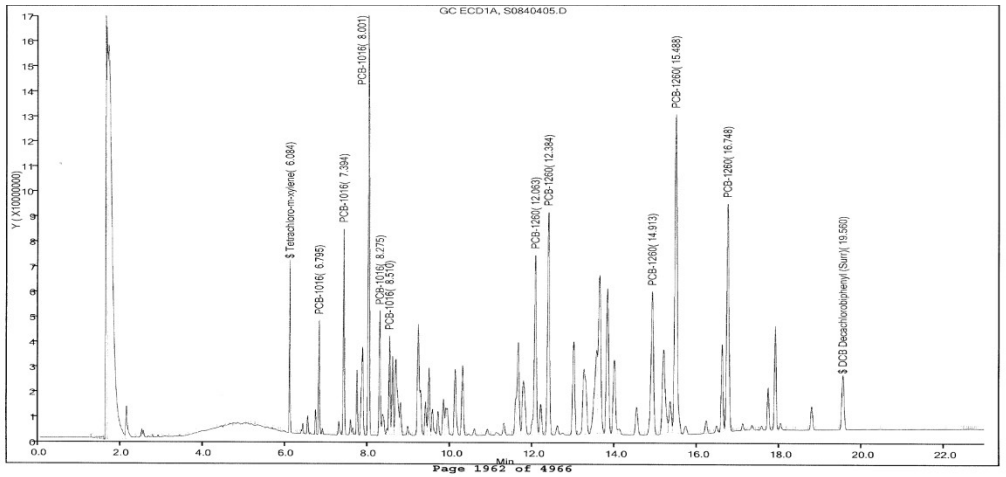


Laboratory Control Sample - Aroclor Example

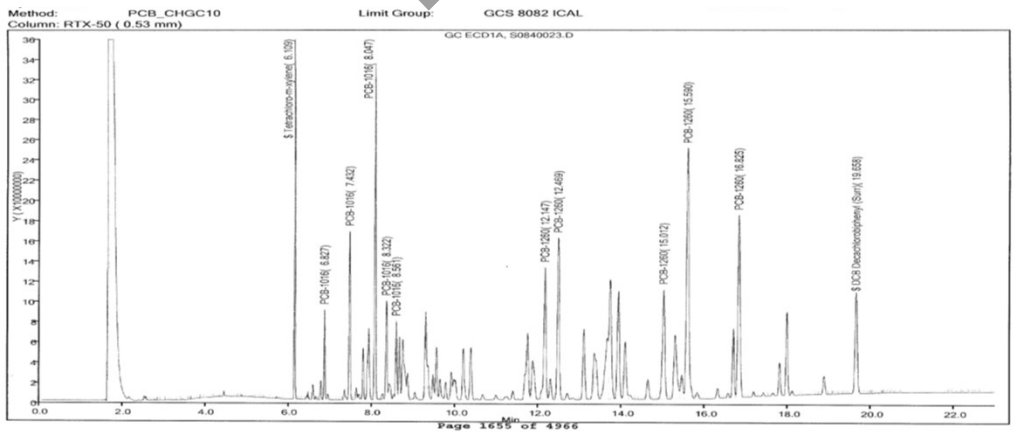
The laboratory control sample is generated by the laboratory by spiking the solution directly onto the PDMS rod, allowing to air dry and then extracting into hexane.

No distortion of the PCB pattern was observed by the laboratory.

Laboratory Control Sample



Calibration Standard



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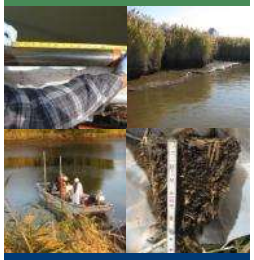
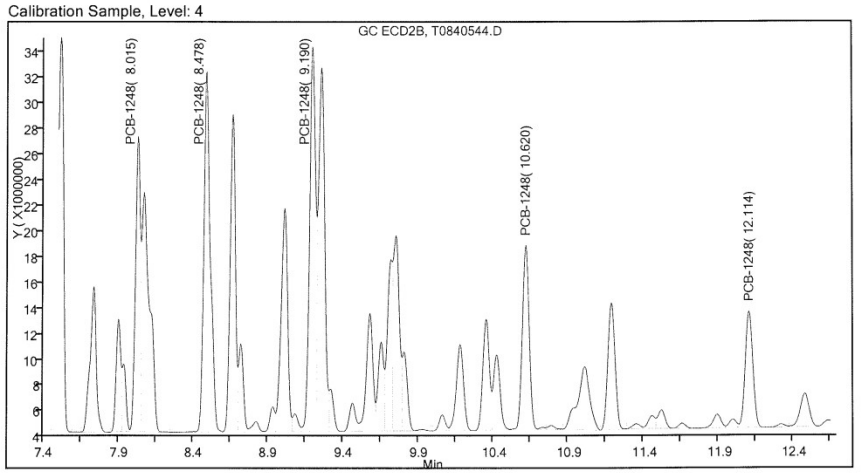


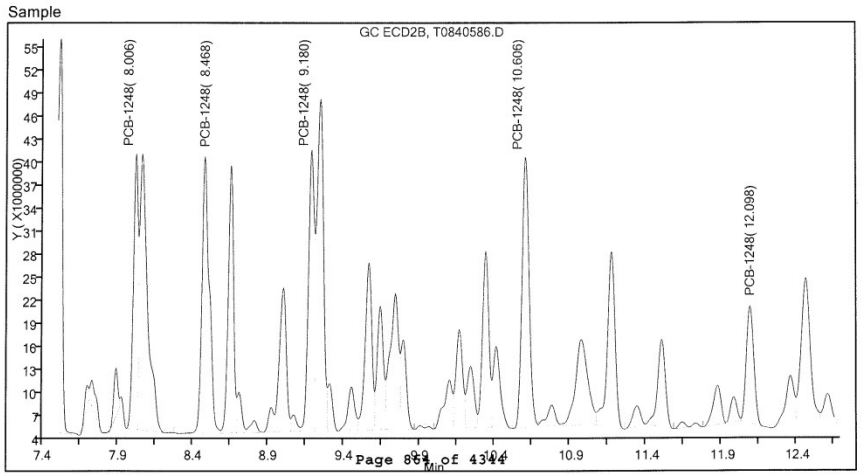
Comparison of Standard Chromatograms to Sample Chromatograms

Both a standard Aroclor 1248 chromatogram and a sample Aroclor 1248 chromatogram are shown here.

Calibration standard 1248 →

Sample Chromatogram - 1248 →





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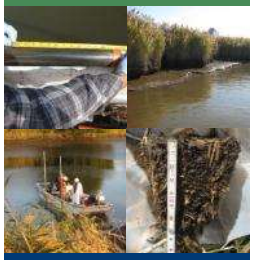

Transparency and Traceability

- In order to maintain full transparency and traceability of the data "full" or CLP-like data packages should be requested from the laboratory.
- Full data packages enable the user to complete full validation and verification of the analytical results.
- Additionally, all final results can be traced from the raw data to completion due to the transparency of the data provided by the data package.

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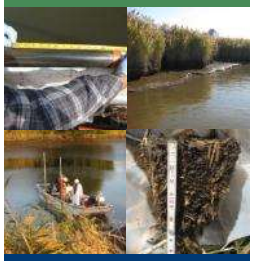

Finally

Always document peer and senior level review with regard to any data that you generate in order to support data quality objectives for a project.

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