Quality Measurement of Non-Traditional Parameters

August 18, 2004

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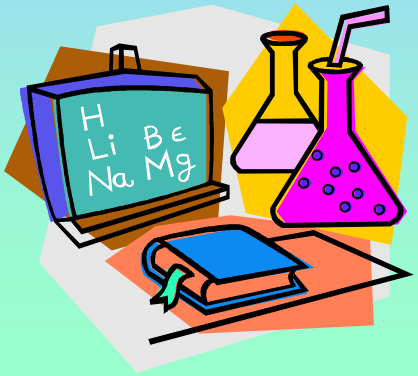
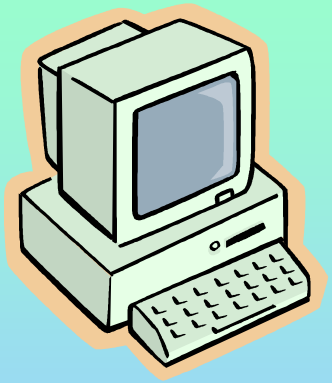
Overview

- List Parameters:
  - Example of Use
  - Method
  - QA/QC:
    - Applicable
    - Unapplicable
- QAPP 4.0
- Summary





Parameters

- SVE vapors/Soil gas
- Dissolved gases
  - Methane, Ethane, Ethene …
  - Hydrogen
  - Acetylene
  - 1,3 Butadiene
- Volatile Fatty Acids
  - Lactic, Pyruvic, Acetic, Propionic …
- Ferrous and Ferric Iron

Vapor Samples - Example

Used to monitor a soil vapor remediation in CA.

- Contaminants: mostly PCE, minor TCE and 1,1,1-TCA
- Measured Extraction effectiveness
  - Allowed point-wise optimization
- Monitored Treatment effectiveness
- Number of samples: 85
- Closing soon
- $17,000 savings in analytical
  - (Summa rental + TO14 analysis) $300/smpl
  - Microseeps analysis $100/smpl

Vapor Samples - Method

- No EPA method.
- Microseeps' AM4.02.
- GC/ECD and GC/FID.
- Designed using QC standards of SW846 8000.
- Use glass vials and autosampler equipped with sample pre-heat to desorb contaminants from sample walls.

Vapor Samples – QA/QC

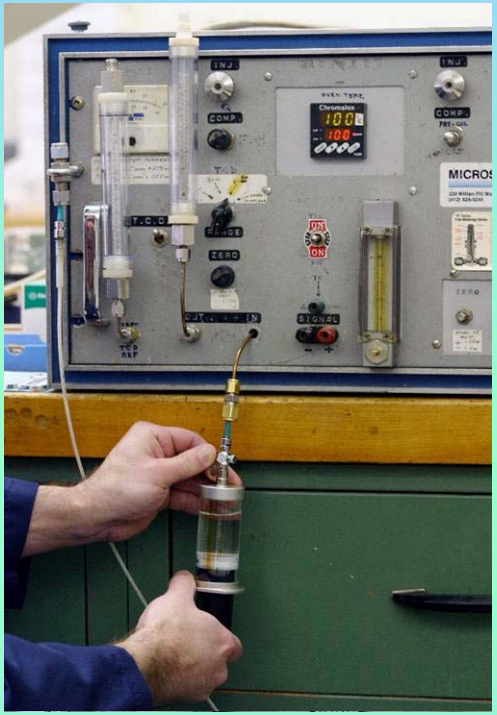
- RSD calibration of GC/FID.
- Rigorous, multi-level “point-to-point” calibration of ECD.
  - ECD exhibits extreme non-linearity.
  - Recoveries best with “point-to-point”.
- Use CCV’s, CCB’s and second sources at 8000 recommended frequency.
- Can not spike, so no surrogates or MS/MSD’s.

Dissolved Gases - Example

- Numerous
  - MEE – MNA/EPR of PCE/TCE in ground water
  - Methane – MNA of gasoline in GW
  - Hydrogen – map redox zones in GW
    - Our Sampling Cell
  - Acetylene, Propane, Butane & Butadiene
    - Iron Wall treatment of GW
    - Abiotic
- Low PQL for MEE means see onset of reductive dechlorination sooner.

Dissolved Gases – Hydrogen Sampler

Dissolved Gases - Method



- Dissolved gases unregulated.
- Microseeps AM20GAX
  - If no H2: prep PM01, fill VOA vial for sampling
  - If H2, sampling method SM9, no prep.
- GC/TCD, GC/FID, GC RGD
- Designed using QC standards of SW846 8000.

Dissolved Gases– QA/QC

- Linear calibration of all detectors.
- Use CCV's, CCB's and second sources at 8000 recommended frequency.
- Do MS/MSD on samples NOT collected for hydrogen.
- No good surrogate spike.
- For samples collected for hydrogen, matrix eliminated as part of sampling – lab can not do MS/MSD.

Volatile Fatty Acids - Example

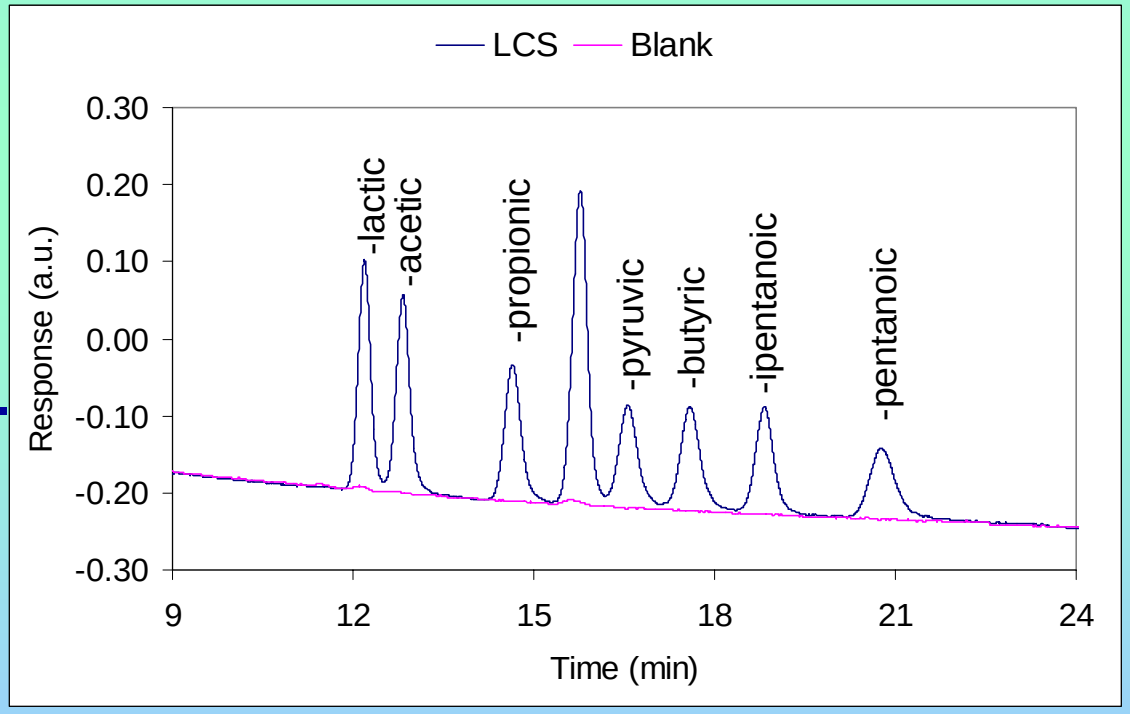
- Remediating chlorinated solvents in GW.
- Initial Site Assessment – is there any good carbon?
  - Much more sensitive than TOC.
  - Speciated (VFA's are very bioavailable).
- Monitor effectiveness of carbon substrate injections
  - Ethanol: EtOH down, acetic acid up.
    - Too quick? Need more complex substrate.
    - Too slow? Bacterial Population insufficiently active.
  - Allows delivery effectiveness assessment.
- Monitor throughout stimulation phase.
  - Take a VOA sample, take a VFA sample

Volatile Fatty Acids - Method

- VFA's unregulated (but stinky).
  - Lactic
  - Acetic
  - Pyruvic
  - Propionic
  - Butyric
  - iso-Pentanoic
  - Pentanoic
  - Iso-Hexanoic
  - Hexanoic
- PQL: 0.07 mg/l (0.1 for hexanoic's)
- Microseeps AM23G.
- IC based with conductivity detection.
- Designed using QC standards of SW846 8000.

Volatile Fatty Acids – QA/QC

- 5 Point linear calibration.
- Standard SW846-8000
  - CCV's.
  - CCB's.
  - MS/MSD's.
  - No surrogate.



Ferrous and Ferric Iron - Example

- Ferrous = Dissolved Iron
  - By Conventional Wisdom
  - Perfect Theory
  - Problem: Oxidation of Ferrous during filtering
  - Consequence: Underestimate ferrous iron concentration
- Ferrous & Ferric by IC – just fill VOA vial

Ferrous and Ferric Iron - Method

- Considered “Modified” SW846-7196.
- IC
  - post column derivatization.
  - single wavelength absorption detection.
- Collect using
  - glass vial with DG septa.
  - HCl preservative.
- Gets both Ferric and Ferrous Iron

Ferrous and Ferric Iron– QA/QC

- 5 Point linear calibration.
- QA/QC according to 7196:
  - CCV's.
  - CCB's.
  - MS/MSD's.
  - No surrogate.

QAPP 4.0

- QAPP 4.0 does not directly address.
- Provide Data Pkg. w/ QA/QC and raw data.
- Provide
  - ERPIMS “like” EDD.
  - Clients preferred EDD format.
- Have Participated in Many AFCEE Projects.

Summary

- Non-Standard Methods
  - Soil Vapor Extraction/Vapor Intrusion.
  - Dissolved Gases.
  - Volatile Fatty Acids.
  - Ferrous and Ferric Iron.
- Documented
  - Procedure.
  - Quality Control.
- EDD support.
- AFCEE experience.

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