

Samples that make labs shudder

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Introduction

- The very samples that need testing can cause problems for the testing facility.
- Evergreen Analytical has received many problem samples in its 22 years of operation.
- Many of these “Problem Samples” would not have been a problem with better communications.

•Types of Problem Samples

- Dangerous Samples
- Samples that cause analytical problems
- Samples where incorrect analytical methods were used

Dangerous Samples

- Hazardous Materials that may endanger laboratory personnel
 - ◆ Toxic chemicals (metals, organic chemicals, gases). Examples : Hg, H₂S
 - ◆ Biohazards (biosludges, medical waste)
 - ◆ Radioactive Materials
 - ◆ Reactive, Corrosive, and Ignitable Materials (RCI)
- Improperly packaged or improperly labeled samples
 - ◆ Bottles without headspace may rupture (pest).
 - ◆ A mis-identified or unidentified matrix may cause

Samples that cause analytical problems

- Laboratories prefer clean samples !
 - ◆ High level samples can contaminate clean samples during storage. EAL will segregate those high level samples if that information is available.
 - ◆ High level samples can cause cross-contamination and carry-over during analysis (PCE).

Samples that cause analytical problems (cont.)

- Difficult matrices can cause analytical problems.
 - ◆ Some samples can de-activate GC columns, invalidating the analysis and causing downtime, extra expense, and affecting other samples on that run (failed CCV).
 - ◆ Samples with high organic content require high dilutions for analysis, causing high reporting limits that may be higher than the regulatory limit. Ppb level analysis in an oil matrix is just not feasible.

Samples that cause analytical problems (cont.)

- ◆ Metals analyses are affected by high levels of salts as well as known interferences. ICP and ICP-MS correct for known interferences but unusually high levels may still cause problems. (Na and Cu, Sb carry-over, Pb carry-over with Cr6+).
- ◆ Multiphase samples containing oils will probably not give accurate results due to a non-homogenous matrix. Emulsions cause problems in solvent extractions. Oily sludges will not be completely digested in metals analyses (EAL uses a microwave digest for oils).
- ◆ Discharge waters that are colored or turbid cannot be analyzed by colorimetric methods (CN, Phenol, Cr6+)

Samples where incorrect methods were used

- Often the specific method is not requested by the client so the wrong method may be performed. That can cause problems with the regulatory agency involved. Usually the sample results are rejected if the analytical method is not appropriate.

- ◆ Discharge waters require methods listed in 40 CFR Part 136 (EPA 600 and 200 series).
- ◆ RCRA samples, UST samples, bio-solids, oils, sludges, most ground waters, and all solids require methods listed in SW-846 (EPA 6000 and 8000 series).
- ◆ Drinking waters require EPA 200 and 500 series tests.

- A BTEX analysis can be done by method 602, 624, 8021, 8260, or 524.

Recommendations for submitting samples

- **Inform the laboratory of any known hazards associated with the samples (MSDS, nature of the spill, field readings, etc). If you had to “suit-up” to take the sample, please warn the laboratory.**
- **Write that information on the COC (chain-of-custody). Verbal communications can get lost or misinterpreted. The samples and communications with Client Services (or Sales or Project Management) may follow two parallel paths that don’t communicate as well as they should. The COC information is usually all that the sample custodian and the analyst knows about your sample.**

Recommendations for submitting samples (cont.)

- Use the COC of the laboratory doing the analysis. A different COC may not list everything the lab requires or may be difficult to interpret.
- List the type of sample and the specific analytical method. If in doubt, talk with the regulatory agency or a laboratory representative. Do not rely on the sample custodian to pick the right test for you. You don't want to pay for results that will not be accepted.
- Leave headspace in all the sample bottles except for VOC vials and BOD bottles. EAL receives many broken 1 Liter bottles because of overfilling.
- Be realistic in your analytical expectations. Difficult matrices will take longer and may not give the desired results.

Conclusion

- Most samples do not have to be problem samples.
- The laboratory is equipped to handle most hazardous samples if the hazards are known.
- Proper communication is the most important aspect of dealing with problem samples.