Laboratory Data MDLs/PQLs

Florida Department of Environmental Protection
Pretreatment Program
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Why Do We Sample?

- “Protect physical, chemical, and biological integrity” (Clean Water Act)
- Surface water, ground water, and residuals quality
- Permit compliance (IU and CA)
How Do You Measure an Analyte?

- Collect sample
- Prepare sample
- Calibrate equipment
- Measure analyte
- Compare analyte measurement to known standard
  - Run quality control samples
Lab Measurements

- There are many different methods to measure various types of analytes.
- Each method has specific quality control requirements to assure valid measurements.
- Refer to Rule 62-4.246, F.A.C.
- Refer to Department’s SOPs

http://www.dep.state.fl.us/labs/sop/index.htm
Precision and Accuracy

• Data needs to be both precise and accurate.
  • Precision: Consistency of measurements.
  • Accuracy: The ability to measure the “true” value.

- Poor precision, Poor accuracy
- Poor precision, Good accuracy
- Good precision, Poor accuracy
- Good precision, Good accuracy
Data Quality

• DEP must verify that data are useable.
  • Consistent with target MDLs and PQLs found in Rule 62-4.246(3), F.A.C.

• Results need to be “real”
  • If result is higher than reported
    • environment is not protected
  • If result is lower than reported
    • costly, unnecessary treatment

• DEP has Statutory Authority to reject data
Definitions

• **Minimum Detection Limit (MDL):** An estimate of the minimum amount of a substance that an analyte process can reliably detect. An MDL is analyte-specific and matrix-specific and laboratory dependent.

• **Practical Quantitation Limit (PQL):** The lowest level of measurement that can be reliably achieved during routine laboratory operating conditions within specified limits of precision and accuracy.
MDL/PQL Radio Reception Analogy

Radio Tower

Whole sentences, complete comprehension > PQL

Static Only: < MDL

A few words, but no meaning = MDL
**MDL/PQL Relationship**

MDL as an Estimate of a Lab’s Ability to **Detect** (not quantitate) at the MDL concentration.

- **Region of known precision and accuracy**
- **Region of high uncertainty for quantitation (greater certainty as PQL is approached)**

- **PQL (4 x MDL)**
- **MDL**
Detection Limit Values

• “U” Values > Permit Limits?
  • Method may not be appropriate; Use more sensitive method (if available)
  • Matrix interference or dilution may contribute to an elevated detection limit

• “I” Values Near Permit Limits
  • Compliance Issue? May require additional testing to resolve
Discharge Monitoring Reports
PQL, MDL and Compliance

• Results $\geq$ PQL are reported as measured
• Results $<$ PQL and $\geq$ MDL shall be deemed as equal to the MDL and reported as such
• Results $<$ MDL shall be reported as the MDL preceded by the less than sign ("<")
Reporting Compliance: Examples

Non-Compliance

Compliance

Result

Permit Limit

PQL

MDL

Concentration

Result

Permit Limit

PQL

MDL

Concentration
Reporting Compliance: Examples

Compliance
(Results < PQL are deemed = MDL)
Reporting Compliance: Examples

Non-Compliance

Compliance

Result is “Non-detect”
Questions?

• Rule 62-4.246, F.A.C.
  www.dep.state.fl.us/labs/docs/mdl_pql_guide.pdf

• Rule 62-160, F.A.C.

• Department’s SOPs
  http://www.dep.state.fl.us/labs/sop/index.htm