

LCMRL and MRL

LCMRL and MRL Definitions

- The LCMRL is the lowest true concentration for which the future recovery is predicted to fall, with high confidence (99%), between 50 and 150% recovery
- The MRL is the lowest analyte concentration which demonstrates known quantitative quality.
 - In most cases, the lowest concentration that has been demonstrated to provide recovery between 50 and 150% with high confidence

LCMRL and MRL Uses

- LCMRL (Lowest Concentration Minimum Reporting Level) is intended for use in method development
 - It is normally a multi-laboratory procedure but could be used to generate a lab specific LCMRL
- MRL is intended for use in a single laboratory
 - It is intended to verify that the laboratory can generate data of acceptable precision and accuracy at the chosen MRL.

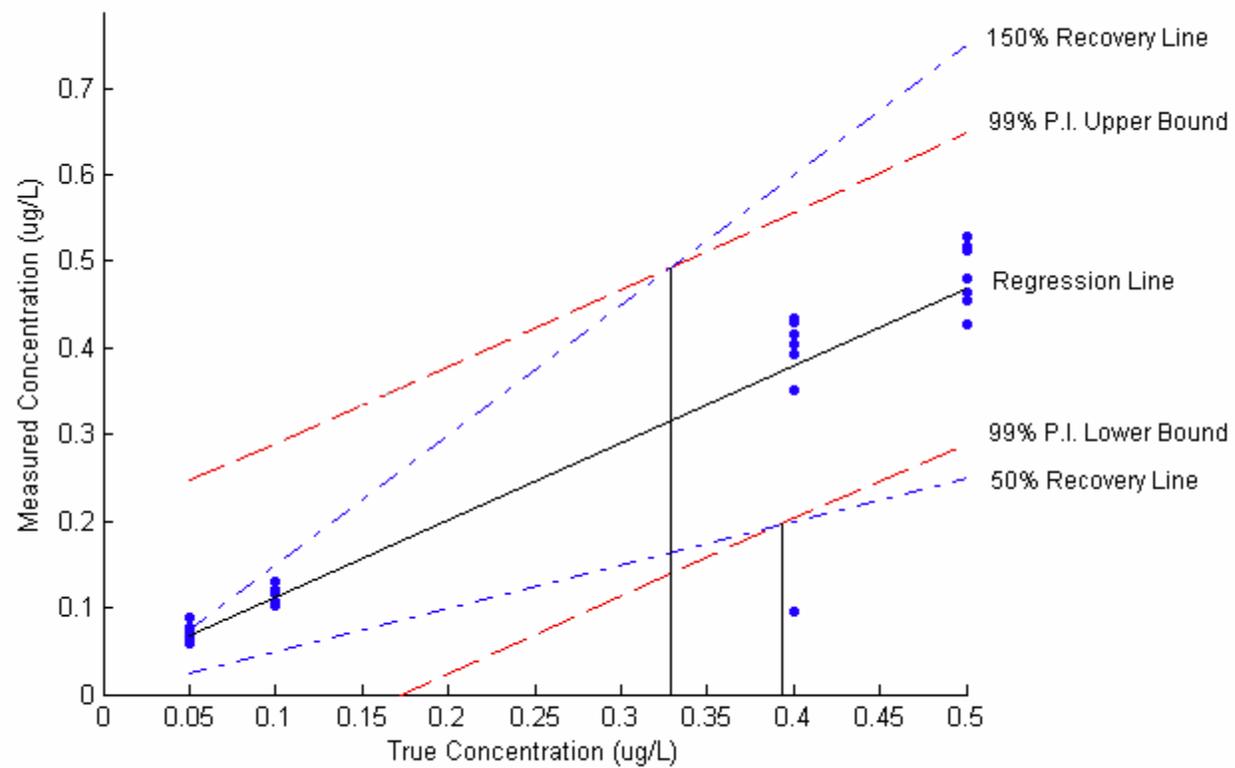
LCMRL procedure

- Recommended minimum data set is 7 replicates at each of 4 different concentrations within the calibration range. Samples are processed through the entire procedure.
 - The lowest concentration should approximate the lowest estimated level that quantitation is possible, at least 3 times signal to noise.

LCMRL procedure

- Data is tested for constant variance and either ordinary or weighted least squares regression is used to model the data.
- The LCMRL is the lowest concentration for which the 99% prediction interval for future data is $< 150\%$ and $> 50\%$.

LCMRL example



MRL

- At least 7 replicates at the MRL
- Calculate prediction interval of results (PIR)
 - $\text{PIR} = \text{Mean} \pm 3.963 \times \text{Standard Deviation of results}$
 - PIR must be within the range 50-150%
- Fairly stringent – for example, if mean recovery is 80%, standard deviation must be $< 30/3.963 = 7.57\%$

Texas PQL

Determination of Precision and Accuracy Criteria

- Step 1

GUESS

| | Metals | Volatiles | Semivolatiles |
|-----------|---------------|------------------|----------------------|
| Precision | 10% RSD | 20% RSD | 30% RSD |
| Accuracy | 70-130% | 70-130% | 50-150% |

There will be poor performers.....

Determination of Precision and Accuracy Criteria

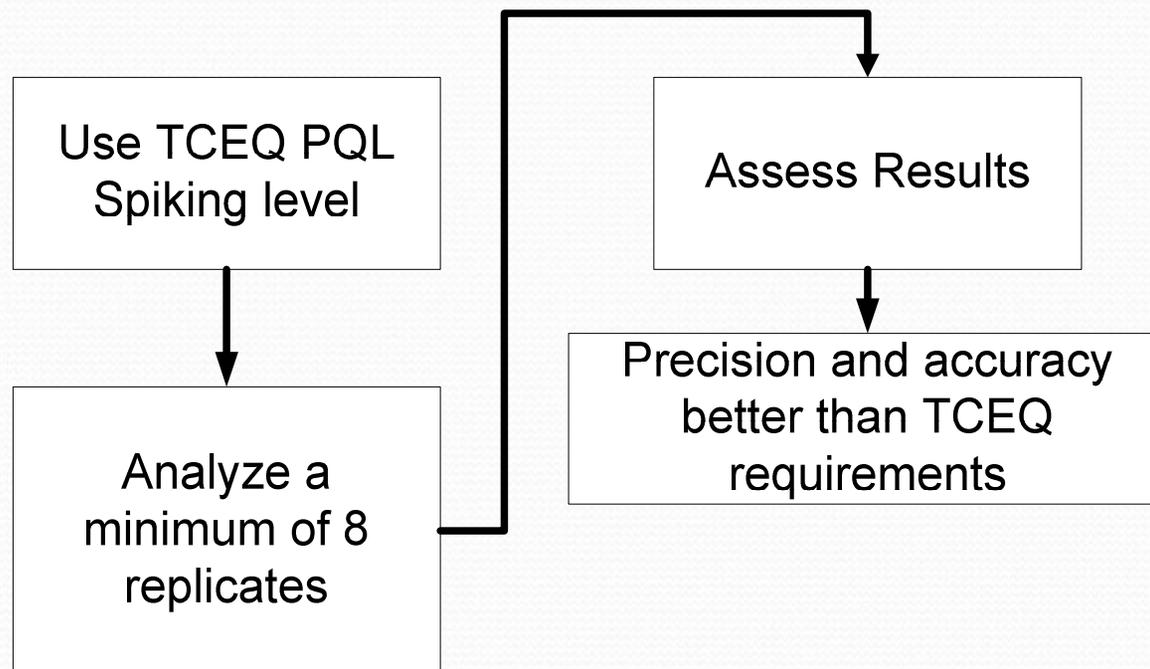
- Step 2

VERIFY

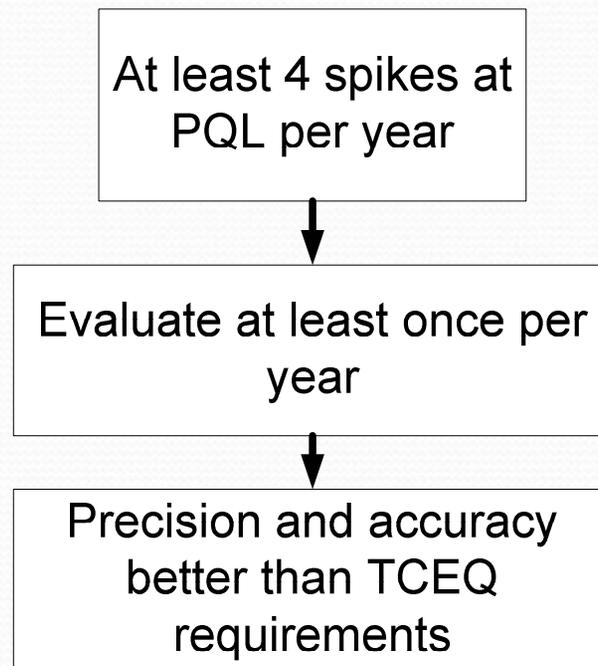
Spike at multiple levels around the anticipated quantitation limit

| Analyte | ug/L | | | | |
|---------------|------|----|----|-----|-----|
| Benzene | 0.5 | 1 | 2 | 4 | 8 |
| Acrylonitrile | 12.5 | 25 | 50 | 100 | 200 |

Texas PQL – Lab initial demonstration



Ongoing verification



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