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# Implementation and Assessment of LCS Control Limits in the Laboratory

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### **Topics**

- What does the QSM require?
- How should a laboratory's in-house LCS control limits be used?
- How should the project-specific LCS control limits be used?
- How should the QSM LCS control limits be used?
- How is the LCS study used in assessments?



#### What is an LCS?

- Laboratory Control Sample.
- Analyte-free matrix spiked with target analytes used to document laboratory performance.
- Prepared with each batch of 20 or fewer samples.
- Processed through the entire samples preparation and analysis sequence.



### What does the QSM Require?

- Laboratories must determine their in-house LCS control limits.
- Compile LCS recovery data for specific analyte-methodmatrix combinations over time (at least 30 samples)
- Must have statistically established LCS control limits for all combinations on scope.
- Must have procedures documented for establishing LCS control limits.



### What does the QSM Require?

- In-house LCS limits must meet requirements listed in 1.7.3.2.3(c) of V1M4 of the QSM Version 5.0.
- LCS limits must be used to monitor performance and estimate contribution to analytical uncertainty.
- Must have procedures documented for establishing LCS control limits.



### **Batch-Specific LCS Requirement**

- An LCS or LCS duplicate pair must be processed with each batch of 20 or fewer field samples (of the same matrix).
- Comparison of LCS results to in-house LCS control limits verifies whether analytical system is in control.
- Comparison of LCS results to MS/MSD results helps identify matrix interferences and other analytical problems.



#### How to use the Lab's Limits

- Project chemist should compare a lab's in-house limits with project specific limits for precision and bias.
- To meet the project's DQOs, the lab's in-house limits must meet the project specific Measurement
   Performance Criteria (or QSM limits) for precision and bias.
- Keep in mind that the LCS is the best case scenario.



## How to use the Project Specific LCS Limits.

- Project teams shall establish project-specific LCS limits.
- DoD QSM limits may be adopted if they meet the projects DQOs.
- Any lab with in-house limits outside the projectspecific limits shall not be used.



### Method-Specified LCS Control Data.

- LCS results (% recovery and standard deviation) published in the method.
- Provide method-performance data under controlled conditions (e.g., single-laboratory trials, specified spike concentrations, skilled analysts, method performed as written) defined in the method.
- Data may represent various matrices, preparation methods, and concentration levels.
- Results should NOT be used as absolute QC acceptance criteria for method performance.



# How to use the QSM LCS Control Limits

- For DoD projects the lab must use the QSM LCS control limits for batch quality control and data reporting unless project-specific limits are specified.
- When project-specific analytes are not included in Appendix C, lab's must use their in-house limits.



# What to Consider When Using the QSM LCS Control Limits

- The QSM limits are likely to have a wider range than individual labs as data was pooled from multiple labs using their own SOPs.
- In most cases the LCS samples were prepared by spiking a matrix at the mid-point of the calibration curve which is likely higher than a project's decision level.



# What to Consider When Using the QSM LCS Control Limits

- Only three classes of analytes (metals, explosives, and PAHs) were evaluated using more than one method meaning only these can be used for method performance comparison.
- Modifications to methods can improve performance but may require method validation and regulatory agency approval.



# How do ABs use the LCS Study in Assessments?

- Ensure that spiking levels are at or below the midlevel and that all target analytes are tracked.
- Spot check for CCV failures when a target analyte fails in the LCS/LCSD.
- Examine LCS trending charts to ensure that the labs in house limits would be able to support the QSM limits for DoD projects.

# How do ABs use the LCS Study is Assessments?

- Look for outliers in LCS trending data and examine corrective actions.
- Ensure that when failures occur, that samples are reextracted or re-processed.
- Ensure that surrogates and target analytes are treated the same for calibration checks.

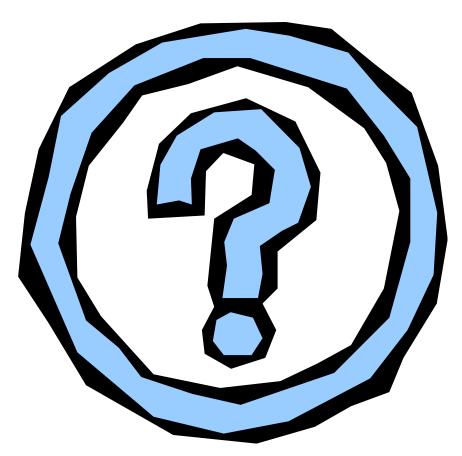


#### **Accreditation?**

- Can a lab be accredited with in-house limits that do not match the QSM limits?
  - Yes—We will evaluate the laboratory in-house limits to ensure that the data supports migration to the QSM/ project limits if necessary.



### **Questions / Comments**





#### For Further Information

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