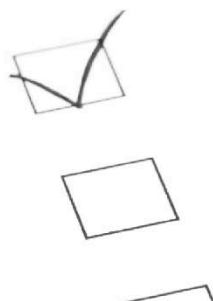


# 2011 CALA BIENNIAL ASSESSOR TRAINING

## Method References: Exact, Modified From or In-House?

Session 3, 6, 16  
Janet Dickson  
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Building Laboratory  
Excellence  
Vers l'excellence  
dans les laboratoires



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## Issue

- Customers of laboratories and regulators rely on accredited scopes to determine if the laboratory capabilities meet their needs.
- There were concerns that sometimes laboratories deviated from the reference method enough that the laboratory method no longer reflected the reference method.

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## A12 - CALA Policy on Reference Methods

*CALA accredited laboratories will ensure that  
scopes of testing accurately reflect the  
reference method.*

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### 3 Ways to List Method References

- 1 If the reference method is followed verbatim, the lab can list the **reference method** without any qualifiers.
- 2 If the lab deviates from the reference method, the lab must list “**modified from [reference method]**”.
- 3 Where the lab has made significant changes to the reference method, the lab can choose a more appropriate method reference or list the method as “**developed in-house**”.

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## Notes

- a. If the reference method allows performance-based modifications (e.g., the CCME PHC method, the BC Hydrocarbon method, some EPA methods) and these performance-based modifications are documented and all requirements and modification procedures specified in the reference method are met, the reference method can still be listed without any qualifiers.
- b. Significant changes that would disallow the use of “modified from” could include application to a different matrix, different principle of detection system....

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- c. There are some cases modifications to the reference method are not generally acceptable in the industry, regardless of the level of validation (e.g., EPA 1311 - TCLP, Toxicity Characteristic Leaching Procedure).
- d. The following is a note from US EPA SW-846: *In addition, SW-846 methods, with the exception of required method use for the analysis of method-defined parameters, are intended to be guidance methods which contain general information on how to perform an analytical procedure or technique which a laboratory can use as a basic starting point for generating its own detailed Standard Operating Procedure (SOP), either for its own general use or for a specific project application. The performance data included in this method are for guidance purposes only, and are not intended to be and must not be used as absolute QC acceptance criteria for purposes of laboratory accreditation.*

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If the labs are quoting EPA methods they should be aware that a lot of the new methods contain a section similar to the following:

From EPA Method 245.7

16 February 2005

9.1.2 Method modifications – In recognition of advances that are occurring in analytical technology, the laboratory is permitted certain options to improve results or lower the cost of measurements. These options include direct electronic data acquisition, calibration using gas-phase elemental Hg standards, changes in the gas-liquid separator or dryer tube design, or changes in the detector (i.e., CVAAS) when less sensitivity is acceptable or desired. Changes in the principle of the determinative technique, such as the use of colorimetry, are not allowed. If a technique other than the CVAAS technique specified in this method is used, that technique must have a specificity for mercury equal to or better than the specificity of the technique in this method.

9.1.2.1 Each time this method is modified, the laboratory is required to repeat the procedure in Section 9.1.1 to demonstrate that an MDL (40 CFR part 136, appendix B) less than or equal to one-third the regulatory compliance level or less than or equal to the MDL of this method, whichever is greater, can be achieved. If the change will affect calibration, the instrument must be recalibrated according to Section 10.

9.1.2.2 The laboratory is required to maintain records of modifications made to this method. These records include the following, at a minimum:

9.1.2.2.1 The names, titles, addresses, and telephone numbers of the analyst(s) who performed the analyses and modification, and the quality control officer who witnessed and will verify the analyses and modification

9.1.2.2.2 A narrative stating the reason(s) for the modification(s)

9.1.2.2.3 Results from all quality control (QC) tests comparing the modified method to this method, including the following:

- (a) Calibration (Section 10)
- (b) Initial precision and recovery (Section 9.1.1.3)
- (c) Analysis of blanks (Section 9.2)
- (d) Matrix spike/matrix spike duplicate (Section 9.5)
- (e) Ongoing precision and recovery (Section 9.4)
- (f) Quality control sample (Section 9.3)
- (g) Method detection limit (Section 9.1.1.1)

9.1.2.2.4 Data that will allow an independent reviewer to validate each determination by tracking the instrument output to the final result.

These data are to include the following:

- (a) Sample numbers and other identifiers
- (b) Processing dates
- (c) Analysis dates
- (d) Analysis sequence/run chronology
- (e) Sample weight or volume
- (f) Copies of logbooks, chart recorder, or other raw data
- (g) Calculations linking raw data to the results reported

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## Implementation of the Policy

- As of October 1, 2010, all appendices that had previously listed “based on [reference method]” had the “based on” prefix changed to “modified from”.
- Findings against the Policy will now be graded as Required A actions.



- From ISO/IEC 17025, Section 5.4.5.2, Laboratories are required to:

*“validate non-standard methods, laboratory-designed/ developed methods, standard methods used outside their intended scope, and amplifications and modifications of standard methods to confirm that the methods is fit for the intended use.”*





For modified methods, it is expected that:

- Labs are able to demonstrate how the lab standard operating procedure (SOP) deviates from the reference method (e.g., a table or section in the SOP that lists deviations from the reference method);
- Method validation is available to demonstrate that method can still meet performance characteristics of the reference method;
- The method is still the same basis and principle as the reference (as evaluated by the technical assessors on site); and,
- The lab reports the methodology as “modified”.

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## What to look for when assessing:

- 1 New Appendix: If there is no method validation, do not assess the appendix. This should be identified during your document review.
- 2 Scope lists: “**Reference Method**”
  - Lab must:
    - follow reference method exactly;
    - be able to readily produce the reference method for comparison to the lab method. (note: not necessarily prior to the assessment).

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- If there are deviations from the reference method:
  - Assessor records a non-conformance that the lab's scope does not accurately reflect the reference method (provide details in the finding whether method validation and deviations were present and documented)

Or

- If the deviations are documented in the method, and the validation supports this, "modified from" can be added to the proposed scope.

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3 Scope lists: “**modified from [Reference Method]**”

- Lab must:
  - Document all deviations from all reference methods listed for each appendix. Deviations can be in a table, a section, or any other method of listing concisely and fully all deviations from the reference method(s).
  - If more than one reference method is listed, lab must list deviations from each reference method.
- The validation has to incorporate all changes made to the method reference.

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- The extent of the validation depends on the changes made but may include such things as trueness, precision, method detection limit, measurement uncertainty, linearity, sensitivity, selectivity, robustness, etc.
- If a lab does not have all modifications from all method references documented, cite as a Required A action.
- If method validation records precede a modification, cite as a Required A action (e.g., validation last performed in 2006 and modification made in 2008).

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- If the modifications to the reference method are found to be significantly different than the reference method:
  - Assessor records a non-conformance that the lab's scope does not accurately reflect the reference method (provide details in the finding whether method validation and deviations were present and documented)

Or

- "developed In-House" can be added to the proposed scope.

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#### 4 Scope lists “developed In-House”

- The degree of validation required for a “Developed In-House” method would be significantly greater than for a published method (i.e., robustness).
- If method validation records precede a modification, cite as a Required A action (e.g., validation performed in 2006 and modification done in 2008).

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- 5 Where the lab reports to the client the reference method and does not indicate “modified from” or “in-house” methods, cite as a Required A action.

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- 6 There may be instances where a final decision regarding the Method Reference listing on the scope cannot be made during the site visit. Please refer these to CALA and provide details as to the issue/concern regarding the method reference listing.



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## Examples of Scope Listings that cannot be used:

- CCME in any matrix but soils
- Modified from EPA TCLP (EPA 1311)

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## Example Assumptions:

- Unless noted in the example, the reference method does not allow for performance-based modifications
- Where the current reference method is not satisfactory, the lab has chosen to not find a different, more suitable method reference.

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The lab always has the option of choosing a different reference method that exactly, or more closely matches the lab method, however, for these examples, assume the lab is not changing their reference method.

## Example Considerations

1. Should the scope listing be:
  - a) [reference method],
  - b) modified from [reference method], or
  - c) in-house?
  
2. What evidence should the assessor be looking before changing the method reference listing from the current listing?
  - (keep in mind that 90-95% of scope listings currently state “modified from”)

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## Examples:

- 1) The lab is using a journal article to draw up a procedure.
- 2) The lab changed the digestion acid: the reference specifies sulphuric; lab uses nitric.
- 3) The lab is using a different type of extraction than specified in the reference method – e.g. Soxhlet vs. tumbler extraction.
- 4) The lab is using a media designed for drinking water tests for a soils method or a food testing method.
- 5) Lab is using EPS 1/RM/33. The volume of test sediment required is 100 ml with 175 ml of overlying water (1:1.75 ratio) in a glass beaker. Some labs use the cone method which is a 1:67 sediment to water ratio conducted in a cone.

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- 1) Generally, this would be “developed in-house”, however, it may depend on the information available from the journal article. Some things to consider are: Is there enough info in a journal article to follow it exactly? Is the QC listed in the article? Is there enough method validation to support the application (matrices, range, specificity...) that the lab is looking for? What method validation has the lab done to support any extension of the method in the journal article?
- 2) Could be “modified from” or “developed in-house”, depending on what the digestion is meant to achieve. In most cases, it would be “modified from” because the acid is just to remove interferences such as organic matter. If the acid chosen could create an interference (e.g., nitric acid and nitrogen compound measurement), then the listing would be “developed in-house”.
- 3) Modified from: as long as the lab can demonstrate similar recoveries as the reference method.
- 4) In-House: The reference method is being applied to a different matrix (refer to slide #4)
- 5) In-House: This is a significantly different change in the ratios of water to sediment used.

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- 1) The laboratory lists several references (e.g., based on Standard Methods 1234, EPA 1342, 1492, 2056) and the lab is taking bits and pieces from each method (e.g., extraction from one method, cleanup from another, detection from a third and holding time from the fourth)?
  - 2) The laboratory has changed from manual process to automated e.g., manual conductivity to MannTech autosampler.
  - 3) Lab uses different extraction solvent: hexane vs DCM
  - 4) Change of incubation temperature from 36+/-0.5C to +/-1C.
  - 5) Reference method states the use of YCT food for Hyalella but lab uses tetramin.

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1) Could be “developed in-house” or “modified from” depending on what information is taken from each reference. Consider whether the combination of parts of separate methods are just different steps of the procedure (e.g., a recommended extraction coupled with a recommended analytical procedure), or whether the different parts were never designed or tested to be performed together as one unified procedure.

2) The procedure remains essentially the same. If the reference method specifies a manual instrument and the lab has automated the process, it must be labeled as “modified from”, but if the reference procedure does not specify whether the instrument is manual or automated, then the listing could be the Method Reference (directly).

3) Could be either “modified from” or “in-house” depending on the method. If the method with the new solvent achieves the same recoveries as the original reference method, then “modified from” could be used, however, if it is a performance-based method, such as Hexane-extractable material vs. the former Total oil and grease, then it would be listed as “developed in-house”.

4) Could be “modified from” or “in-house” depending on how much validation of the expanded temperature range the lab has performed to support the change.

5) Modified from

1) The reference method lists 22 target analytes but the lab has added:

- 1) 2 more analytes
- 2) 20 more analytes

2) The lab has developed a method from the manufacturer's instructions.

3) The laboratory has changed the chromatography of column (e.g., GC or HPLC): If the change is:

- 1) change of manufacturer but phase similar,
- 2) change of phase.

4) The lab is using reagent water for preparing media that has a chlorine limit of <0.04 mg/l, instead of <0.01 mg/l as stated in Standard Methods.

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- 1) "Modified from" if the analytes are related to those in the reference method but, if unrelated to the reference method target list, then it would be "developed in-house". If 20 analytes are being added, it is likely that not all would be related to the original target list in the reference method, so the listing would be "developed in-house" the lab would need to have a lot of method validation to support the addition of all analytes
- 2) Depends on how much method validation has been performed to develop the manufacturer's method and that the lab has access to. Has the manufacturer done extensive validation for the specified matrix. Could be any of "Method Reference", "modified from" or "developed in-house" depending on available method validation information from the manufacturer.
  - 3.1) "modified from" if the reference method specifies the exact column to use but does not include "or equivalent". If the reference method does not specify the specific column, or states "or equivalent" and an equivalent column is chosen, then it could be "Method Reference" directly. A change from, for example, a DB-1 to a DB-5 column may not be significant (depending on the target analyte list) and so might also be listed as "modified from".
  - 3.2) If the phase change is significant (e.g., from a polar to non-polar phase), then "developed in-house".
- 4) "modified from" if the reference method requires the <0.01 mg/l criteria.

## Examples:

- 7) The lab changes equipment specified in the reference method, e.g.,:
  - a) change MS to TOF/MS
  - b) change MS to HRMS
  - c) Change HRMS to MS
  - d) Change ICP to ICP/MS
  - e) Change AA to ICP
  - f) Change titrimetric to colourimetric
  - g) Change of radial ICP to Axial ICP

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- a) Modified from
- b) Modified from
- c) "Modified from" or, if the reference method does not allow for going to a less sensitive technique, possibly "developed in-house"
- d) In house
- e) In-house
- f) In-house
- g) Method Reference

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## Summary

*CALA accredited laboratories will ensure that scopes of testing accurately reflect the reference method.*

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This is basically what you have been checking during assessments all along – not much is different than what you have done in the past.



### 3 Ways to List Method References

- 1 If the reference method is followed verbatim, the lab can list the **reference method** without any qualifiers.
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