

SYNOPSIS OF CHANGES TO BC LABORATORY MANUAL, MARCH 2017

A. INTRODUCTION

The British Columbia Ministry of Environment (MOE) has updated the Laboratory Manual with new analytical methods for use under the *Contaminated Sites Regulation*. Fifteen new or revised methods were distributed for comments on March 27, 2017. The effective date for the new methods (for new substance in Stage 10 Amendments) is November 1, 2017.

B. LIST OF ACRONYMS

The acronyms used in the Summary of Laboratory Method Revisions (Section C) are defined below:

ALS	ALS Laboratories
APHA	Animal and Plant Health Agency
BC	British Columbia
BCELTAC	British Columbia Environmental Laboratory Technical Advisory Committee
BCLQAAC	British Columbia Laboratory Quality Assurance Advisory Committee
CCME	Canadian Council of Ministers of the Environment
CCV	Continuing Calibration Verification
CSR	Contaminated Sites Regulation
CVS	Calibration Verification Standard
DCM	Dichloromethane
DIPA	Diisopropylamine
DQO	Data Quality Objective
ECD	Electron Capture Detector
ECF	Extract Concentration Factor
EMS	Environmental Monitoring System
EPA	Environmental Protection Agency
EPH	Extractable Petroleum Hydrocarbons
FID	Flame Ionization Detector
GC	Gas Chromatography
HCl-HH	Hydrochloric Acid-Hydroxylamine Hydrochloride
HPLC	High Performance Liquid Chromatography
ICPMS	Inductively Coupled Plasma Mass Spectrometry
LCMS	Liquid Chromatography Mass Spectrometry
LCS	Laboratory Control Samples
MELP	Ministry of Environment, Lands and Parks
MOE	Ministry of Environment
MS	Mass Spectrometry
PBM	Performance Based Method
PID	Photoionization Detection

QC	Quality Control
RM	Reference Material
SALM	Strong Acid Leachable Metal
VH	Volatile Hydrocarbons
VOC	Volatile Organic Compound

C. SUMMARY OF LABORATORY METHOD REVISIONS

This synopsis of the revisions to the Laboratory Manual includes the date of the revision and a summary of the method revision. This summary is from the Revision History of each method. For current methods that have been revised, if possible, comments related to potential changes in analyte concentrations due to the revision are provided. The method numbers correspond to the list numbers distributed on March 27, 2017. The acronyms are defined in the List of Acronyms (Section B).

1. ALCOHOLS IN SOIL AND WATER – PBM

New BC Lab Manual Method in support of 2017 CSR updates.

2. ALKYLPHENOL AND ETHOXYLATES IN SOILS AND SEDIMENTS BY LC-MS/MS

New BC Lab Manual Method in support of 2017 CSR updates.

3. ALKYLPHENOL AND ETHOXYLATES IN WATER BY LC-MS/MS

New BC Lab Manual Method in support of 2017 CSR updates.

4. ANALYSIS OF CYANIDE (TOTAL, WEAK ACID DISSOCIABLE, AND FREE) – PBM

New method, replaces Cyanide Colour Development: Isonicotinic Barbituric Acid method, defines cyanide terms, and provides general guidance and requirements for all current MOE approved cyanide analysis techniques.

Impact of new methodology on analyte concentrations: No changes to measured analyte concentrations are anticipated as a direct result of this revision. However, cyanide chemistry is complex, and virtually all cyanide test methods can be subject to different interferences. The new method permits several cyanide analysis instruments and method principles, each based on references published by agencies such as US EPA, ISO, ASTM. Consult the method and your laboratory for more specific details.

5. ASBESTOS IN SOIL

New BC Lab Manual Method in support of 2017 CSR updates.

6. CHLORINATED AND NON-CHLORINATED PHENOLS IN SOILS – PBM

Consolidates and replaces several existing methods in PBM format. Updated to include additional phenolic substances listed in the 2017 CSR. GC-ECD option added for nitrophenols for improved sensitivity and detection limits.

Impact of new methodology on analyte concentrations: No significant changes anticipated to analyte test measurements. Will support lower detection limits for nitrophenols if GC-ECD is used.

7. CHLORINATED AND NON-CHLORINATED PHENOLS IN WATER – PBM

Method revised to include additional phenolic substances from 2017 CSR Omnibus updates. GC-ECD option added for nitrophenols to improve sensitivity where required.

Impact of new methodology on analyte concentrations: No significant changes anticipated to analyte test measurements. Will support lower detection limits for nitrophenols if GC-ECD is used.

8. CYANIDE, TOTAL OR WEAK ACID DISSOCIABLE BY MANUAL DISTILLATION – PBM

New method, combines and replaces previously existing BC Lab Manual methods for total cyanide by H₂SO₄ & HCl-HH distillations, and for weak acid dissociable cyanide by distillation. Refers to new lab manual method for cyanide analysis for analytical options.

Impact of new methodology on analyte concentrations: No significant changes to test results are anticipated. Refer to analytical method comments (method #4 above) for further details.

9. DIGESTION FOR TOTAL METALS IN WATER – PRESCRIPTIVE

Added tungsten and zirconium which are new substances in the 2017 CSR.

Impact of new methodology on analyte concentrations: No changes made to core test method conditions, so no effect on test measurements for existing analytes.

10. EXTRACTABLE PETROLEUM HYDROCARBONS (EPH) IN WATER BY GC/FID

Corrected formula error with ECF in Calibration and Analysis section.

Impact of new methodology on analyte concentrations: No changes made to core test method conditions, so no effect on test measurements for existing analytes..

11. GLYCOLS IN SOIL AND WATER – PBM

New BC Lab Manual Method in support of 2017 CSR updates.

12. LIQUID-SOLID PARTITIONING AS A FUNCTION OF LEACHATE PH – PRESCRIPTIVE

New BC Lab Manual Method in support of 2017 CSR updates.

13. METHYLMERCURY IN SOILS/SEDIMENTS – PBM

New BC Lab Manual Method in support of 2017 CSR updates.

14. METHYLMERCURY IN WATERS – PBM

New BC Lab Manual Method in support of 2017 CSR updates.

15. POLYCYCLIC AROMATIC HYDROCARBONS IN SOLIDS BY GC/MS – PBM

Additional analytes and EMS codes added to support 2017 CSR updates. Analytes with no soil standards were deleted. Matrix Spikes (or RM) added to QC requirements, and QC DQOs were revised to align with CCME methods guidance. Format updated to 2017 version.

Impact of new methodology on analyte concentrations: No changes made to core test method conditions, so no effect on test measurements for existing analytes. New QC requirements were implemented.

16. POLYCYCLIC AROMATIC HYDROCARBONS IN WATER BY GC/MS – PBM

Additional analytes and EMS codes added to support 2017 CSR updates, & some PAHs without water standards were removed. Preservation guidance updated for consistency with current MOE preservative and hold time requirements. Definition and calculation protocols added for Methylated Naphthalene (for marine water quality guideline). DQOs for optional Matrix Spikes added. QC DQOs were revised to align with CCME methods guidance. Requirement for use of internal standards added for consistency with soils method. Format updated to 2017 version.

Impact of new methodology on analyte concentrations: No changes made to core test method conditions, so no effect on test measurements for existing analytes. New QC requirements were added.

17. STRONG ACID LEACHABLE METALS (SALM) IN SOIL – PRESCRIPTIVE

Added tungsten and zirconium which are new substances in the 2017 CSR. Minor changes for compliance with CCME guidance manual included requirement for LCS QC (previously recommended), and change of storage temperature from ambient to $\leq 6^{\circ}\text{C}$ for Hg (unless dried).

Impact of new methodology on analyte concentrations: No changes made to core test method conditions, so no effect on test measurements for existing analytes.

18. TRACE METALS ANALYSIS BY ICP-MS-PBM

Added tungsten and zirconium which are new substances in the 2017 CSR. Added thorium as it is already in the Total Metals in Water digestion method and sulfur as it is already in the SALM method.

Impact of new methodology on analyte concentrations: No changes made to core test method conditions, so no effect on test measurements for existing analytes.

19. VOLATILE HYDROCARBONS (VH) IN WATERS BY GC/FID

Revised to new format. Removed Purge & Trap as prescriptive element. Allowed for Headspace analysis. Requirement for Method Performance Spike was replaced with new requirement to run Laboratory CVS's (gasoline) with each batch. Meta-Xylene calibration standard was clarified such that meta/para-Xylene mixtures may also be used. Maximum batch size changed from 50 to 20 samples to coincide with industry standard practice. Calibration changed to minimum 3 point linear with narrower 20% CCV requirement. Preservative options updated to include sodium bisulfate, copper sulfate preservative option deleted.

Impact of new methodology on analyte concentrations: No significant changes are anticipated to laboratory test measurements due to this revision. The primary change was administrative, in formally including allowance for the use of headspace analysis for VH (several labs already use headspace for this method, with approvals having been made on a case-by-case basis). The method includes performance criteria to ensure data consistency between purge and trap and headspace analysis techniques.

20. VOLATILE ORGANIC COMPOUNDS IN SOLIDS – PBM

Significantly expanded list of analytes to cover volatile substances in 2017 CSR. Added reference to EPA 8021B for PID parameters.

Impact of new methodology on analyte concentrations: No changes made to core test method conditions, so no effect on test measurements for existing analytes.

21. VOLATILE ORGANIC COMPOUNDS IN WATER – PBM

Updated to current method format. Where applicable, aligned with VOC in solids method, including use of headspace GC/MS and PID for selected analytes. Significantly expanded list of analytes to cover volatile substances in 2017 CSR. Deleted copper sulfate preservation option. Updated QC and internal standard acceptance criteria.

Impact of new methodology on analyte concentrations: Allowance for use of PID within this method for selected analytes was intended to support field testing (e.g. for BTEX). PID analysis is much more subject to interferences or false positives versus GC/MS. Confirmations of critical test results made by PID are recommended using GC/MS where high confidence is required. Core GC/MS method conditions were not changed so no effect on test measurements for existing analytes by GC/MS.

22. 17A-ETHINYLESTRADIOL IN WATER BY LCMS/MS – PBM

New BC Lab Manual Method in support of 2017 CSR updates.

23. DIISOPROPANOLAMINE (DIPA) IN WATER AND SOIL SAMPLES BY HPLC – PBM

New BC Lab Manual Method in support of 2017 CSR updates.

24. SULFOLANE IN WATER AND SOIL SAMPLES BY GC/MS – PBM

New BC Lab Manual Method in support of 2017 CSR updates.