

Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water (LEPH & HEPH)

Parameters Light Extractable Petroleum Hydrocarbons in water
Heavy Extractable Petroleum Hydrocarbons in water

Light Extractable Petroleum Hydrocarbons in solids
Heavy Extractable Petroleum Hydrocarbons in solids

Analyte Symbols and EMS Codes	Analyte Symbol	Approx MDL	EMS Code
	LEPH _w	250 µg/L	LEPH F064
	LEPH _{w-SG}	250 µg/L	code pending
	HEPH _w	250 µg/L	HEPH F064
	HEPH _{w-SG}	250 µg/L	code pending
	LEPH _s	200 µg/g	LEPH F085
	LEPH _{s-SG}	200 µg/g	code pending
	HEPH _s	200 µg/g	HEPH F085
	HEPH _{s-SG}	200 µg/g	code pending

(Note that the above EMS codes are for results corrected for PAHs).

Analytical Method Refer to the following LEPH/HEPH precursor methods:

Extractable Petroleum Hydrocarbons in Water by GC-FID.
Polycyclic Aromatic Hydrocarbons in Water by GC/MS/SIM.

Extractable Petroleum Hydrocarbons in Solids by GC-FID.
Polycyclic Aromatic Hydrocarbons in Solids by GC/MS/SIM.

Units Waters: µg/L
Soils: µg/g (dry weight)

Introduction Light and Heavy Extractable Petroleum Hydrocarbons are calculated using the results from selected methods as listed above. The calculation procedure for LEPH and HEPH requires that both Extractable Petroleum Hydrocarbons (EPH) and Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed using methodologies which have been approved by the Director.

Selected PAHs are subtracted from EPH results to produce LEPH and HEPH values. These PAHs are excluded from LEPH and HEPH because they are regulated directly under the British Columbia (BC) Contaminated Sites Regulation (CSR). PAHs subtracted from HEPH/LEPH for waters are listed in Schedule 6 of the CSR. PAHs subtracted from HEPH/LEPH for soils are listed in Schedules 4 and 5 of the CSR. The Procedure section lists which of the excluded PAHs are to be subtracted from LEPH, and which are to be subtracted from HEPH, for both waters and soils.

Silica Gel treated LEPH and HEPH results may be used for comparison to the BC CSR LEPH/HEPH standards, but only where clearly indicated through the use of uniquely identified parameter names (containing "SG"), and only where there is justification for the use of silica gel cleanup at the site based on the anticipated or observed presence of interferences to EPH due to a prevalence of naturally occurring organics.

Approval to subtract additional target compounds that are not listed below is at the discretion of the Director of Waste Management.

Procedure

Subtract the total applicable PAHs from the appropriate EPH fraction:

$$\text{LEPH} = \text{EPH}_{10-19} - \sum \text{PAHs from CSR schedule(s) within EPH}_{10-19} \text{ range}$$

$$\text{HEPH} = \text{EPH}_{19-32} - \sum \text{PAHs from CSR schedule(s) within EPH}_{19-32} \text{ range}$$

Treat PAH results reported as less than detection limit as zero (no subtraction).

To calculate LEPH_w (or LEPH_{w-SG}), subtract the individual results for acenaphthene, acridine, anthracene, fluorene, naphthalene, and phenanthrene from the EPH_{w10-19} (or EPH_{w10-19-SG}) concentration obtained by the approved EPH GC/FID method.

To calculate LEPH_s (or LEPH_{s-SG}), subtract the individual results for naphthalene and phenanthrene from the EPH_{s10-19} (or EPH_{s10-19-SG}) concentration obtained by the approved EPH GC/FID method.

To calculate HEPH_w (or HEPH_{w-SG}), subtract the individual results for benz(a)anthracene, benzo(a)pyrene, fluoranthene, and pyrene from the EPH_{w19-32} (or EPH_{w19-32-SG}) concentration obtained by the approved EPH GC/FID method.

To calculate HEPH_s (or HEPH_{s-SG}), subtract the individual results for benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene, and pyrene from the EPH_{s19-32} (or EPH_{s19-32-SG}) concentration obtained by the approved EPH GC/FID method.

PAH results used for the calculation of LEPH and HEPH must be by GC/MS or by HPLC.

Report results in units of mg/kg (dry weight) for solids, and in units of ug/L or mg/L for waters.

Co-Reporting Requirements

Designated regulated PAH substances are allowed (and required) to be subtracted from EPH concentrations because they are regulated independently. Consequently, it is required that the subtracted PAHs must be co-reported whenever LEPH and HEPH results are reported. Laboratories are not permitted to remove test results for co-reported parameters after initial reporting.

LEPH/HEPH Co-Reporting Requirements are as follows:

LEPHs	naphthalene	phenanthrene
HEPHs	benz[a]anthracene, benzo[a]pyrene benzo[b]fluoranthene benzo[k]fluoranthene	dibenz[a,h]anthracene indeno[1,2,3-cd]pyrene pyrene
LEPHw	acenaphthene acridine anthracene	fluorene naphthalene phenanthrene
HEPHw	benz(a)anthracene benzo(a)pyrene	fluoranthene pyrene

Revision History

Nov 6, 2015	Revised to include allowance for LEPH/HEPH with silica gel cleanup. Added and defined new co-reporting requirement for PAHs. Removed maximum reporting limit guidance. Aligned preferred units to CSR standards. Effective Date: Jan 4, 2016.
Dec 31, 2000	Incorporated into main BC Laboratory Manual, EMS codes added, former methods superceded.
1998-1999	Revision of historical hydrocarbon methods by ASL (now ALS) under contract to BC MOE with guidance from BCLQAAC (now BCELTAC).