

## **DRAFT 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

<b>Analyte Symbols and EMS Codes</b>	<b>Analyte Symbol</b>	<b>Approx MDL</b>	<b>EMS Code</b>
	LEPH <sub>w</sub>	0.25 mg/L	LEPH F064
	LEPH <sub>w-SG</sub>	0.25 mg/L	refer to MOE EMS website
	HEPH <sub>w</sub>	0.25 mg/L	HEPH F064
	HEPH <sub>w-SG</sub>	0.25 mg/L	refer to MOE EMS website
	LEPH <sub>s</sub>	0.25 mg/L	LEPH F085
	LEPH <sub>s-SG</sub>	0.25 mg/L	refer to MOE EMS website
	HEPH <sub>s</sub>	0.25 mg/L	HEPH F085
	HEPH <sub>s-SG</sub>	0.25 mg/L	refer to MOE EMS website

(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: mg/L  
Soils: mg/kg (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 EH 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<sub>w</sub> (or LEPH<sub>w-SG</sub>), subtract the individual results for acenaphthene, acridine, anthracene, fluorene, naphthalene, and phenanthrene from the EPH<sub>w10-19</sub> (or EPH<sub>w10-19-SG</sub>) concentration obtained by the approved EPH GC/FID method.

To calculate LEPH<sub>s</sub> (or LEPH<sub>s-SG</sub>), subtract the individual results for naphthalene and phenanthrene from the EPH<sub>s10-19</sub> (or EPH<sub>s10-19-SG</sub>) concentration obtained by the approved EPH GC/FID method.

To calculate HEPH<sub>w</sub> (or HEPH<sub>w-SG</sub>), subtract the individual results for benz(a)anthracene, benzo(a)pyrene, fluoranthene, and pyrene from the EPH<sub>w19-32</sub> (or EPH<sub>w19-32-SG</sub>) concentration obtained by the approved EPH GC/FID method.

To calculate HEPH<sub>s</sub> (or HEPH<sub>s-SG</sub>), 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<sub>s19-32</sub> (or EPH<sub>s19-32-SG</sub>) 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 of 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 reported to BC MOE where LEPH and HEPH results are used for compliance purposes.

LEPH/HEPH Co-Reporting Requirements are as follows:

<b>LEPHs</b>	naphthalene	phenanthrene
<b>HEPHs</b>	benz[a]anthracene, benzo[a]pyrene benzo[b]fluoranthene benzo[k]fluoranthene	dibenz[a,h]anthracene indeno[1,2,3-cd]pyrene pyrene
<b>LEPHw</b>	acenaphthene acridine anthracene	fluorene naphthalene phenanthrene
<b>HEPHw</b>	none (not regulated)	

**Revision History**

- March 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.
- 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 MELP and with guidance from the BCLQAAC Technical Committee.