U.S. EPA's Region 5 Environmental Services and Assistance Team has developed a revised analytical approach for EPA to use when measuring total petroleum hydrocarbons (TPH). This revised approach measures 6 groups of compounds (See Table 1) that are consistent with those described in the U.S. EPA (2022) Provisional Peer-Reviewed Toxicity Value (PPRTV) fraction-based TPH assessments.

In the revised analytical approach, hydrocarbons are measured in two fractions, aliphatic and aromatic. Each of those fractions is separated into three groups – low, medium, and high corresponding to their carbons. To screen for the aliphatic low carbon range fraction, the aromatic low carbon range fraction, and the aromatic medium carbon range fraction, EPA Method SW-846 8260C and the Massachusetts Method for the Determination Volatile Petroleum Hydrocarbons by Gas Chromatography/Mass Spectrometry were modified and utilized for quantitation.

To screen for the aliphatic medium carbon range fraction, the aliphatic high carbon range fraction, and the aromatic high carbon range fraction, EPA Method 8015 and the Massachusetts Method for the Determination Extractable Petroleum Hydrocarbons [EPH] were modified and utilized for quantitation. Samples were first extracted utilizing EPA Method 3545A (Accelerated Solvent Extraction) and then fractionated into aliphatic and aromatic solutions using a silica gel column. Each of these fractions was then analyzed to quantitate the aliphatic ranges present (medium and high carbon range) and the aromatic high carbon range of hydrocarbons present in the sample.

The new analytical SOPs have been validated internally at the laboratory and are shared internally within EPA for further review and validation. Contact: Michelle Kerr, Chemist, US EPA Region 5, kerr.michelle@epa.gov.

| Group | Carbon Range | EC Range | Reference Methods |
|---|---|---|---|
| Aliphatic Low | C5 - C8 | EC5-EC8 | SW-846 8260C, MA VPH Revision 0 (2017)* |
| Aliphatic Medium | C9 – C18 | EC>8 – EC16 | SW-846 8015, MA EPH (2019)** |
| Aliphatic High | C19 – C32 | EC>16 – EC35 | SW-846 8015, MA EPH (2019)** |
| Aromatic Low | C6 – C8 | EC6 - < EC9 | SW-846 8260C, MA VPH Revision 0 (2017)* |
| Aromatic Medium | C9 – C10 | EC9 - < EC11 | SW-846 8260C, MA VPH Revision 0 (2017)* |
| Aromatic High | C10 – C32 | EC11 – EC35 | SW-846 8015, MA EPH (2019)** |

Table 1. For the TPH Assessment, the six groups, the relative carbon range, the relative equivalent carbon number, and the associated reference methods.***

* Method for the determination of Volatile Petroleum Hydrocarbons (VPH) by Gas chromatography/ Mass Spectrometry. Massachusetts Department of Environmental Protection, January 2017

** Method for the Determination of Extractable Petroleum Hydrocarbons (EPH) Revision 2.1. Massachusetts Department of Environmental Protection, December 2019.

*** The groups listed in Table 1 are consistent with the U.S. EPA's (2022) PPRTV fraction-based TPH assessments.

EC - equivalent carbon number