



Testing Requirements of the new NEPM

INTRODUCTION

While the draft NEPM has been available since 2010, the promulgation of the final document occurred in May 2013. There are many changes which impact industry professionals. From a laboratory perspective and interacting with laboratories there are two main areas -

1. Testing requirements
2. Sampling plus analysis

This EnviroMail covers several key testing requirements and changes that relate to laboratory procedures and sample submission/COCs. In addition it refers to other EnviroMails that cover some key topics in more detail.

KEY TOPICS COVERED IN THIS ENVIROMAIL:

- TRH/BTEXN (plus F1-F4) [EnviroMail 51](#)
- NEPM Metals Suite Changes
- HSL Soil classification, ABC's and ACL's
- CYANIDE CHANGES
- PAHS B(a)P TEQ [EnviroMail 59](#)
- PBDE's [EnviroMail 60](#)

ITEMS COVERED IN ENVIROMAIL 68:

- TPH Silica Gel
- Holding Time Changes
- Sampling of Ground Waters Including Metals
- Split Samples (Secondary Duplicates)

ITEM COVERED IN ENVIROMAIL 70:

- Why don't my Naphthalene results agree and why should I use the Volatile result for waters?

NEPM B1 2013 - TRH/BTEXN F1 and F2

While the changes in the NEPM around TPH and TRH may seem significant most have been adopted by laboratories for some time. ALS released EnviroMail 51 in April 2011 covering the likely NEPM changes. This has allowed the industry to receive the old TPH and new TRH plus F1 reporting for two years to support long term projects.

EnviroMail 51 has now been updated and includes reporting of F2. Please see the adjacent link to EnviroMail 51 or visit www.alsglobal.com.

	Waters LOR	Soils LOR
EP080/071: Total Petroleum Hydrocarbons		
C6 - C9 Fraction	20 µg/L	10 mg/kg
C10 - C14 Fraction	50 µg/L	50 mg/kg
C15 - C28 Fraction	100 µg/L	100 mg/kg
C29 - C36 Fraction	50 µg/L	100 mg/kg
C10 - C36 Fraction*	50 µg/L	50 mg/kg
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013		
C6 - C10 Fraction	20 µg/L	10 mg/kg
C6 - C10 Fraction minus BTEX (F1)	20 µg/L	10 mg/kg
ΣC10 - C16 Fraction	100 µg/L	50 mg/kg
ΣC10 - C16 Fraction minus Naphthalene (ex. VOC) (F2)*	100 µg/L	50 mg/kg
ΣC16 - C34 Fraction	100 µg/L	100 mg/kg
ΣC34 - C40 Fraction	100 µg/L	100 mg/kg
ΣC10 - C40 Fraction*	100 µg/L	50 mg/kg
EP080: BTEXN		
Benzene	1 µg/L	0.2 mg/kg
Toluene	2 µg/L	0.5 mg/kg
Ethylbenzene	2 µg/L	0.5 mg/kg
meta- & para-Xylene	2 µg/L	0.5 mg/kg
ortho-Xylene	2 µg/L	0.5 mg/kg
Sum of BTEX*	2 µg/L	0.2 mg/kg
Total Xylenes*	2 µg/L	0.5 mg/kg
Naphthalene	5 µg/L	1 mg/kg

* = Calculated as the sum of individual analytes reported at or above the LOR.
* F1 is calculated as the difference between the C6 - C10 fraction and Sum of BTEX
* F2 is calculated as the difference between the C10 - C16 and Naphthalene.

NEPM B1 2013 METALS

The 1999 NEPM included 13 metals in the equivalent table 1A covering HILs. The new NEPM has several changes as follows:

1. The removal of Barium, Chromium and Vanadium.
2. The addition of Chromium (VI), Boron and Selenium.

This metals listing has long been covered by ALS Suite S-3. With the new NEPM ALS will offer the new metals gratis as the continuation of current metals on existing projects. It is thought to be inappropriate to remove the Barium and Vanadium where existing projects have required this. The net effect is that ALS will offer 15 total metals at current rates.

Total Chromium analysis offers industry the ability to screen for Hexavalent Chromium (Cr (VI)) more cost effectively, as the total Chromium analysis includes Hexavalent and/or Trivalent Chromium. Extended soil holding times for Cr (VI) may allow industry to request this post screening as the holding time is now 28 days. It is also recommended that the requirement for Clay Content and Iron analysis should be reviewed when testing for Cr (VI) (refer to NEPM B1 - table 4 and section 2.5.9).

PBDEs

The 2013NEPM includes HILs for PBDEs. These chemicals to be tested are discussed in EnviroMail 60.

HSL SOIL CLASSIFICATION

The new NEPM also has changes around Soil Classification (refer to B1 section 2.4.7 and adjacent table).

Where there is reasonable doubt as to the soil texture a conservative approach is to be used, or laboratory analysis is to be performed. Other parameters such as moisture and organic carbon content may also be considered. Laboratories typically report moisture as standard practice so this need not be requested.

ADDED CONTAMINANT LIMITS (ACL)

The new NEPM also defines 'Added Contaminant Limit' (ACL). This is the added concentration above the 'Ambient Background Concentration' (ABC). ACLs are based upon soil characteristics of pH, CEC and Clay content. Toxicity of contaminants in the environment can also be affected by other physiochemical properties including Organic Carbon and Iron.

As a result of the new NEPM, additional testing may be required on some samples to further classify or assess toxicity of soils e.g. % Clay when testing Hexavalent Chromium. Given the variety of different scenarios no new ALS suites have been created. The tests are best requested as 'pH, CEC, Clay Content, TOC or % Iron' on COCs although '% Iron' may be added into standard ALS metals suites to assist industry.

CYANIDE DETERMINATION

The new NEPM Schedule B3 also has changes for Cyanide testing. The previous B3 referenced a total cyanide method whereas the new version talks about the potentially toxic free cyanide. Determination uses the more conservative WAD (Weak Acid Dissociable) measure as a surrogate for Free Cyanide. If the WAD Cyanide result conforms to the HIL then the free cyanide is deemed also to conform with the HIL. In summary of the chemistry;

- Free Cyanide = HCN and ionic CN⁻
- WAD CN = Free CN + most unstable metal CN complexes (the majority of Cu, Ni, Ag, Cd and Zn complexes) that *could* form Free CN under the right conditions (pH 4.5 being the nominated pH).
- Total CN = Free + WAD + strong metal CN complexes (e.g. Ferro & Ferri-CN complexes.)

PAHS AND TEQ REPORTING

PAHs also have changes (refer to EnviroMail#59). The adjacent TEFs are used to calculate a TEQ based upon the eight carcinogenic PAHs. With TEQ reporting, the three calculation options will be reported. Examples and background on each follow (examples assume ALS LORs of 0.5mg/kg for the 8 PAHs tested):

PAH species	TEF	PAH species	TEF
Benzo(a)anthracene	0.1	Benzo(g,h,i)perylene	0.01
Benzo(a)pyrene	1	Chrysene	0.01
Benzo(b+j)fluoranthene	0.1	Dibenz(a,h)anthracene	1
Benzo(k)fluoranthene	0.1	Indeno(1,2,3-c,d)pyrene	0.1

1. The first calculates the TEQ assuming PAHs not detected are actually at the LOR (termed TEQ LOR). This is **most conservative** and can give **false positive TEQs** (not all PAHs undetected will be just below or at LOR). This can give a variance of 1.2 mg/kg TEQ as B(a)P versus an HIL of 3.0 for residential A criteria.
 "E.g. if 2.3mg/kg of B(a)P or Dibenz(a,h)anthracene is detected, with no other PAHs present, the 'TEQ LOR' calc' gives a TEQ of 3.0 mg/kg. This is a conservative 0.7mg/kg above the actual 2.3mg/kg TEQ of the sample."
2. This option uses zero when PAHs are <LOR (termed TEQ Zero). This is **least conservative** and is more prone to **false negative TEQs** when other PAHs are actually found on site or might be in your samples.
 E.g. If your PAHs TEQ added up to 2.0mg/kg excluding B(a)P & Dibenz(a,h)anthracene and both were not detected in the sample a TEQ of 2.0mg/kg would be reported. But, if B(a)P & Dibenz(a,h)anthracene were in fact just below the LOR, then the real TEQ could be 3.0mg/kg TEQ and a false negative result therefore occurs.
3. Lastly, is the 'half LOR' option (termed TEQ ½ LOR). This is **mid-way** from a risk perspective.
 - a. In the Option 1 example above, a TEQ of 2.7mg/kg would be reported – closer to the real result.
 - b. In the option 2 example above, a TEQ of 2.5mg/kg would be reported – between the two results.

REFERENCES

NEPM B1 Guideline on Investigation levels for Soil and Groundwater – May 2013 (F2013L00768)

NEPM B3 Guideline on Laboratory Analysis of Potentially Contaminated Soils – May 2013, (F2013L00768)

Table 2. HSL soil classification and equivalent soil classification in AS 1726

HSL soil classification	AS 1726 Equivalent
Sand	Coarse-grained soil
Silt	Fine-grained soil - silts and clays (liquid limit <50%)
Clay	Fine-grained soil - silts and clays (liquid limit >50%)