
**California Regional Water Quality Control Board
Los Angeles Region
(Underground Storage Tank Program)**

**General Laboratory Testing Guidance for Petroleum Hydrocarbon
Impacted Sites**

(September 10, 2020 update)

The purpose of this document is to supplement the Regional Board's Laboratory Requirements and Quality Assurance/Quality Control (QA/QC) Plan and set forth the new requirements for fuel oxygenates and Monitored Natural Attenuation (MNA) and Natural Source Zone Depletion (NSZD) testing. Each analytical method used must be certified by the California Environmental Laboratory Accreditation Program (ELAP).

1. General Laboratory QA/QC Requirements

Conform to the Regional Board's Laboratory Requirements and QA/QC Plan in general, and items specified below for petroleum hydrocarbon impacted sites.

2. Compounds to be Tested

Total petroleum hydrocarbons in gasoline range (TPHg) (C4 – C12); Total petroleum hydrocarbons in diesel range (TPHd) (C13 – C22); benzene, toluene, ethylbenzene, xylenes (BTEX); naphthalene; methyl tertiary butyl ether (MTBE); di-isopropyl ether (DIPE); ethyl tertiary butyl ether (ETBE); tertiary amyl methyl ether (TAME); tertiary butyl alcohol (TBA). If the gasoline tanks historically or currently contain methanol or ethanol, these compounds are also to be tested. For waste oil tanks, a full suite of EPA Method 8260B (GC/MS), and polycyclic aromatic hydrocarbons (PAHs) are also to be analyzed.

3. Analytical Test Methods and Detection Limits

Conform to Table 1 below. Report any concentration detected between the method detection limit (MDL) and estimated quantitation limit (EQL) (or reporting limit (RL)) in a numerical value with a "J" flag indicator. All "Non-Detect" (ND) shall be reported in the format with "< (numerical MDL)." Integrate all fuel oxygenate additive concentrations into total petroleum hydrocarbons (TPH) and report it as TPH.

General Laboratory Testing Requirements for Petroleum Hydrocarbon Impacted Sites

Table 1: Analytical Requirements

Analyte	Analytical Method	Required MDL	
		Soil (µg/kg)	Water (µg/L)
BTEX	EPA Method 8260B (or 8021B)	1	0.5
MTBE	EPA Method 8260B	2	1
DIPE	EPA Method 8260B	2	1
ETBE	EPA Method 8260B	2	1
TAME	EPA Method 8260B	2	1
TBA	EPA Method 8260B	10	10
Naphthalene	EPA Method 8260B (or 8270C)	5	0.5
TPHg	Cal-LUFT GC/FID or GC/MS	100	50
TPHd	Cal-LUFT GC/FID	1000	100
Methanol	Cal-LUFT GC/FID	100	100
Ethanol	Cal-LUFT GC/FID (or 8260B)	100	100
PAHs ¹	EPA Method 8270C	1	1

¹PHA=polycyclic aromatic hydrocarbons. 16 priority pollutant PAHs = naphthalene, acenaphthene, acenaphthylene, anthracene, phenanthrene, fluorene, chrysene, fluoranthene, pyrene, benzo(b)fluoranthene, benzo(a) pyrene, benzo(k)fluoranthene, benzo(a)anthracene, indeno(1,2,3-c,d)pyrene, dibenz(a,h)anthracene, benzo(g,h,i)perylene.

4. Use of EPA Method 5035 for Soil Samples

Apply EPA Method 5035A specified in the USEPA SW-846, (7/2002) for soil sample preparation and preservation in order to minimize volatile organic losses. Use the sample collection devices, or equivalent, specified in the method (e.g., the Encore™ sampler). If the Encore™ sampler is used, analyze sample within 48 hours from the collection. Analyze sample within 14 days holding time for soil samples stored under frozen conditions.

5. Monitored Natural Attenuation (MNA) Parameters

Natural attenuation processes include dispersion/diffusion, dilution, sorption, volatilization, biodegradation, and chemical or biological transformation. A carefully controlled monitoring program for the natural attenuation can be used to confirm site-specific mass reduction and achieve remedial objectives. In order to test parameters to

confirm the occurrence of natural attenuation, site characterization must be complete first.

5.1 Primary Natural Attenuation Criteria

Meet the following conditions prior to testing for the secondary natural attenuation parameters:

- a) Groundwater contaminant plume must be fully delineated.
- b) Groundwater monitoring program on a regular basis must be implemented for at least two years including data of MTBE and other oxygenates.
- c) Groundwater concentration has consistently decreased or been stable.
- d) Determination of site-specific hydraulic conductivity must be conducted: Refer the ASTM D4044-91 for the slug test procedures. Other field methods (e.g., pumping test/baildown test) are also acceptable to determine hydraulic conductivity.
- e) Characterization of MTBE and other oxygenates plume vertical extent may be needed with discrete multi-depth groundwater sampling at all groundwater vulnerable areas designated by the Board.

5.2 Secondary Natural Attenuation Parameters

Analyze the secondary natural attenuation parameters only after the primary natural attenuation criteria are met. Analyze the secondary natural attenuation parameters at all groundwater monitoring wells inside and outside of the plume. Conform to Table 2 below for parameters and testing methods.

Table 2: Analytical Requirements for Secondary Natural Attenuation Geochemistry Parameters

Parameter	Test Method	Required MDL
pH	EPA Method 150.2 or Field instrument	not applicable
Dissolved oxygen (DO)	EPA Method 360.1 or Field instrument	not applicable
Redox potential (ORP)	Field instrument	not applicable
Sulfate (SO ₄ ²⁻)	EPA Method 300	1 mg/L
Nitrate (NO ₃ ⁻)	EPA Method 300	0.05 mg/L
Ferrous iron (Fe ²⁺)	EPA Method 200	0.05 mg/L
Manganese (Mn ²⁺)	EPA Method 200	0.05 mg/L
Methane (CH ₄)	EPA Method 8015(M)	0.005 mg/L

5.3 Natural Source Zone Depletion (NSZD) parameters for light non-aqueous phase liquid (LNAPL) impacted sites

- a) Meet all primary Natural Attenuation Criteria as specified in section 5.1 above, and particularly for LNAPL transmissivity test.
- b) Analyze secondary Natural Attenuation geochemistry parameters in Table 2 above.
- c) Analyze tertiary parameters including bacteria DNA and isotope tests.

6. Electronic Submittal of Data Reporting

All analytical results shall be uploaded in an electronic format to the State GeoTracker Database.