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

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

March 2021 update

The purpose of this document is to provide supporting details regarding laboratory testing guidance to supplement the general laboratory analysis guidelines included in the Regional Board's directives pertaining to investigation, monitoring and assessment at petroleum impacted sites.

This document was last revised in September 2006 to update testing requirements including the addition of testing for fuel oxygenates and natural attenuation parameters. This 2021 update aligns the Regional Board's guidance with the State's Low-Threat Underground Storage Tank Case Closure Policy, adopted on May 1, 2012, and revises some analytical method detection limits in response to methodological advancements.

Environmental laboratories must be accredited by the California Environmental Laboratory Accreditation Program (ELAP) for each analytical method used to conduct sample analysis. Information about applying for ELAP accreditation is available at the following website link:
https://www.waterboards.ca.gov/drinking_water/certlic/labs/apply.html

1. General Laboratory Quality Assurance and Quality Control (QA/QC) Requirements

For petroleum hydrocarbon impacted sites, conform to the standard laboratory analysis QA/QC guidance in any applicable Regional Board directive, and with the items specified below.

2. Compounds to be Tested

Compounds to be tested include: Total petroleum hydrocarbons in the gasoline range (TPHg) (C4 – C12); Total petroleum hydrocarbons in the 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), and ethanol. If the underground storage tanks (USTs) historically contained, or currently contain, jet fuel, kerosene, mineral spirits, biofuel, or methanol, these compounds are also to be tested. For waste

oil tanks, the full suite of volatile organic compounds included in 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-Detects” (NDs) shall be reported in the following format: “< (numerical MDL).” Integrate fuel oxygenate additive concentrations into the TPH gasoline range result in addition to reporting these oxygenate concentrations individually.

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	EPA Method 8260B or EPA Method 8015B	100	50
TPHd	EPA Method 8015B	1000	100
Methanol	EPA Method 8015B	100	100
Ethanol	EPA Method 8015B or EPA Method 8260B	100	100
PAHs ¹	EPA Method 8270C	1	1

¹PAH=polycyclic aromatic hydrocarbons. The sixteen (16) priority pollutant PAHs include: 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, and benzo(g,h,i)perylene.

4. Use of EPA Method 5035 for Soil Samples

Apply EPA Method 5035A (7/2002) specified in the USEPA publication, Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, also known as SW-846, for soil sample preparation and preservation in order to minimize volatile organic losses. Other

preservation methods may be acceptable for the same purpose. Use the sample collection devices, or equivalent, specified in the method (e.g., the Encore™ sampler). If the Encore™ sampler is used, analyze the sample within 48 hours from collection. Analyze samples within the 14 days holding time for soil samples stored under frozen conditions.

5. Monitored Natural Attenuation (MNA) Parameters (As Needed)

Natural attenuation processes include dispersion, diffusion, dilution, sorption, volatilization, biodegradation, and chemical or biological transformation. A carefully controlled monitored natural attenuation (MNA) program can be used to confirm whether site-specific mass reduction is occurring through natural attenuation to achieve remedial objectives. Prior to monitoring natural attenuation parameters, site characterization must first be complete. Note that monitoring natural attenuation parameters may not be needed for site-specific closure evaluation. The State Low-Threat Underground Storage Tank Case Closure Policy's closure criteria incorporate the tenet of natural attenuation. Therefore, monitoring natural attenuation parameters is not typically necessary for petroleum impacted sites that meet the Policy's closure criteria.

5.1 Primary Natural Attenuation Criteria

The following conditions must be met prior to testing for secondary natural attenuation parameters:

- a) The groundwater contaminant plume must be fully delineated.
- b) The groundwater monitoring program must have been implemented on a regular basis for at least two years and include data for MTBE and other oxygenates.
- c) Concentrations in groundwater have been shown to consistently decrease or are stable.
- d) Determination of site-specific hydraulic conductivity must be conducted: Refer to ASTM D4044-96 for the slug test procedures. Other field methods (e.g., pumping test/baildown test) are also acceptable to determine hydraulic conductivity.
- e) Characterization of the vertical extent of the MTBE and/or other oxygenates plume(s) 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 for secondary natural attenuation parameters only after the primary natural attenuation criteria are met. Analyze for 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	0.005 mg/L

6. Electronic Submittal of Data Reporting

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