



UNDERSTANDING EXTRACTABLE PETROLEUM HYDROCARBONS and VOLATILE PETROLEUM HYDROCARBONS WATER TEST RESULTS

The purpose of this informational handout is to help you understand petroleum test results for your drinking water. The Maine Department of Environmental Protection [DEP] relies on laboratory tests called EPH [Extractable Petroleum Hydrocarbons] and VPH [Volatile Petroleum Hydrocarbons] to test for the presence of gasoline or fuel oil in drinking water. These tests provide information needed to determine if drinking water supplies near petroleum spills are contaminated with petroleum above health-based guidelines.

Petroleum does not contain just one single compound [for example benzene], but many hundreds of compounds, all based on the chemistry of carbon and hydrogen. That is why petroleum compounds are commonly referred to as “hydrocarbons.” Some of the compounds contained in petroleum [again, for example benzene] are more harmful than others. The EPH and VPH tests identify concentrations of the more harmful compounds and those that are more abundant in fuels [called target compounds] and also identify all of the remaining petroleum hydrocarbons by grouping compounds with similar chemical properties and toxicity into “fractions” as shown on the table below. Each fraction has its own health guideline.

EPH/VPH Defined Hydrocarbon Fractions

Hydrocarbon Fraction	Analytical Method
C9-C18 aliphatics	EPH
C19-C36 aliphatics	EPH
C11-C22 aromatics	EPH
C5-C8 aliphatics	VPH
C9-C12 aliphatics	VPH
C9-C10 aromatics	VPH

To determine the health risk from petroleum contamination in your water, DEP may have to use one or both tests. Our recommendations for testing depend on the type of petroleum product spilled as outlined in the table below.

Recommendations for EPH and VPH Testing

Petroleum Product	VPH	EPH
Gasoline	X	
Fresh diesel/#2 fuel oil	X	X
Weathered diesel/#2 fuel oil		X
#3 - #6 fuel oils		X
Waste oil	X	X
Jet fuels/kerosene	X	X
Mineral oil/dielectric oils		X
Unknown oils or sources	X	X

To determine if a water supply is safe to use, the DEP compares sample results from these tests to a list of health-based guidelines developed by the Maine Center for Disease Control and Prevention’s [CDC’s] Environmental Toxicology Program. These guidelines are conservative and assume you will drink approximately two quarts of water from this particular water supply every day for 70 years. Although EPH/VPH test results are detailed and require explanation, these test methods do a better job of addressing the health implications of petroleum releases than previous [simpler] testing and allow the DEP to better determine appropriate actions for protecting drinking water based on human health concerns.

Below are explanations of the various sections of most laboratory reports.

Result: Numbers contained in this column represent the concentration of target compounds and fractions detected in your water. Compare these numbers to the drinking water guidelines in the table below. Results above the guidelines indicate that the water may not be safe for regular use without treatment. Results less than the guidelines are generally considered to be safe for use. When test results are close to the drinking water guideline, the DEP may still wish to take measures to address the petroleum found.

GUIDELINES FOR TARGET COMPOUNDS AND FRACTIONS

<i>Test</i>	<i>Target Compound</i>	<i>Guideline [ug/L or PPB]</i>
VPH TEST	Benzene	4
	Ethylbenzene	30
	Methyl-tert-butyl ether (MTBE)	35
	Naphthalene	10
	Toluene	600
	Total xylenes	1,000
	<i>Fractions:</i>	
	C5-C8 Aliphatic Hydrocarbons	300
	C9-C12 Aliphatic Hydrocarbons	700
	C9-C10 Aromatic Hydrocarbons	200
EPH TEST	2-Methylnaphthalene	30
	Acenaphthene	400
	Acenaphthylene	400
	Anthracene	2,000
	Benzo(a)anthracene	0.5
	Benzo(a)pyrene	0.05
	Benzo(b)fluoranthene	0.5
	Benzo(g,h,i)perylene	200
	Benzo(k)fluoranthene	5
	Chrysene	50
	Dibenz(a,h)anthracene	0.05
	Fluoranthene	300
	Fluorene	300
	Indeno(1,2,3-cd)pyrene	0.5
	Naphthalene	10
	Phenanthrene	200
	Pyrene	200
	<i>Fractions:</i>	
	C9-C18 Aliphatic Hydrocarbons	700
	C19-C36 Aliphatic Hydrocarbons	14,000
C11-C22 Aromatic Hydrocarbons	200	

The analytical results section also contains the following information:

- **Range/Target Analyte:** This is a list of the parameters that are included on the test. Note that unadjusted results should be ignored. They are included only for DEP information purposes.
- **Surrogate %Recovery:** Surrogate chemicals are added to the sample in the laboratory to determine the accuracy of the test. These chemicals were **not** found in your water.
- **RL [Reporting Limit]:** The minimum concentration of a compound or a hydrocarbon fraction that the laboratory will report. Concentrations less than this RL are reported out in the result column as “U” (undetected) or < [less than] the reporting limit. In some cases the laboratory will report an estimated concentration lower than the RL and flag the result with a “J” to indicate the number is estimated.
- **Units:** How the sample was measured, usually in micrograms per liter [ug/l] or parts per billion [ppb] for water samples. Micrograms per liter are comparable to parts per billion.

For Further Assistance: If you have questions or need assistance understanding your petroleum test results and what they mean, please call the DEP chemist at 207-287-7878.