

Risk-Based Levels for Total Petroleum Hydrocarbons (TPH)

Total petroleum hydrocarbons (TPH) is typically defined as carbon chains in the range of C6 through C35. Products containing TPH include a wide variety of mixtures that may contain hundreds to thousands of hydrocarbon compounds including aliphatic (straight carbon chain) and aromatic (benzene ring) compounds.

This guidance is specific to the analysis and development of cleanup levels for TPH and is intended to be used for cleanups at sites where volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals, have been screened out or are also being fully evaluated. If additional chemicals such as polychlorinated biphenyls (PCBs) or pesticides are suspected, they may also need to be evaluated. Since individual chemicals and metals have specific toxicity information, TPH can be addressed once the underlying chemicals and metals have been screened out.

DEQ's Risk Team should be contacted prior to initiating a cleanup under this guidance, if anything other than the Tier 1 Residential level is used. The Team may be reached at (405) 702-5100.

Cleanups of refined product spills fall under DEQ's Diesel and Gasoline Spills guidance.

TPH Ranges

DEQ defines three ranges of TPH, although there is often overlap between the ranges from each individual source (i.e. refined gasoline or diesel).

Gasoline range	(GRO) >C6-C12
Diesel range	(DRO) >C13-C28
Lube oil range	>C28-C35

In the past, TPH was reported as a single overall number. However, analyses are now generally reported as TPH in the various ranges in which they occur.

Analytical Methods¹

To ensure consistent data quality, DEQ requires data from laboratories that are recognized by the State of Oklahoma laboratory accreditation program, or equivalent. DEQ-accredited labs may be found at <https://go.usa.gov/xdQWq>.

¹ Texas Commission on Environmental Quality (TCEQ) analytical methods discussed in this guidance may be found at <https://www.tceq.texas.gov/remediation/analysis.html>.



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DEQ recommends TCEQ Method 1005 for preliminary characterization of soil and groundwater. Other methods that cover similar ranges may be used; however, use of methods other than TCEQ Method 1005 should be discussed with the DEQ Risk Team prior to use. All TCEQ Method 1005 TPH analyses should be conducted without the use of a silica gel or similar “clean up” method. For all analyses, ensure that the chosen laboratory is able to reach adequate detection limits.

Cleanup Levels

DEQ uses three Tiers of TPH cleanup levels, based upon either protection of groundwater or the relative toxicity of the hydrocarbon ranges.

Tier 1 is a generic cleanup level applicable to residential scenarios, and is based on protection of groundwater.

Tier 2 represents cleanup levels for each of the three TPH ranges for both residential and industrial scenarios. Levels are based on the relative toxicity of the hydrocarbon ranges.

Tier 3 is a site-specific scenario and includes use of TCEQ Method 1006 to determine which aliphatic or aromatic fractions are present.

All three Tiers assume other priority pollutants have been evaluated. If other contaminants are present, you will need to discuss with DEQ’s Risk Team to determine the correct approach for determining total risk present at the site. Use of any level beyond Tier 1 Residential is considered a risk-based remediation. For DEQ approval of a risk based remediation, groundwater investigation and monitoring, and a deed notice may be required.

Tier 2 and 3 cleanups may require temporary or permanent monitoring well installation as part of the investigation. Since dilution and attenuation vary depending on soil type, site lithology, and other site-specific parameters, coordination with DEQ’s Risk Team will be needed to ensure the cleanup level is protective of groundwater. Prior to developing Tier 3 site-specific cleanup levels, please contact DEQ’s Risk Team for approval of all assumptions and inputs made for site-specific determinations.

Tier 1

Tier 1 Generic Cleanup Levels	Ground water	Soil
RESIDENTIAL	1.0 mg/L	50 mg/kg

Tier 2

Generic Cleanup Levels		Ground water (mg/L)	Soil (mg/kg)
RESIDENTIAL	GRO (C6-C12)	*1.0	†500
	DRO (C12-28)		†400
	Lube Oil (>C28-35)		†1,800
INDUSTRIAL	GRO (C6-C12)	*1.0	†2,500
	DRO (C12-28)		†2,610
	Lube Oil (>C28-35)		†23,000

*Total of all the ranges. Use of any level beyond Tier 1 Residential is considered a risk-based remediation. For DEQ approval of a risk based remediation, groundwater investigation and monitoring, and a deed notice may be required.

†Cumulative risk for all three fractions will also need to be considered.

Tier 3 – Site Specific

1. Initial TPH analysis should be TCEQ Method 1005 and be conducted without the use of a silica gel or similar clean up method.
2. Determine the specific fractions of TPH present, aliphatic and aromatic, using TCEQ Method 1006. Analysis should be conducted on samples with greater impacts, as determined by TCEQ Method 1005 analysis.
3. Consult with DEQ's Risk Team at (405) 702-5100 to determine appropriate Tier 3 cleanup levels.