

LAND

Risk-Based Levels for Total Petroleum Hydrocarbons (TPH)

Total petroleum hydrocarbons (TPH) are 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 (carbon ring) compounds.

Evaluating hundreds to thousands of compounds can be impractical. Evaluations for overall TPH are common and generally accepted. Some hydrocarbon mixtures may also contain priority pollutants including volatile organic compounds (VOCs), semi-volatile compounds (SVOCs), and metals, each of which have their own specific toxicity information. Other TPH mixtures do not contain significant levels of priority pollutants. In the past, some scientists believed that TPH materials without underlying priority pollutants were not a problem. This view is no longer generally held in the scientific community. Cleanup of TPH without underlying priority pollutants is currently a common practice. DEQ generally requires analysis of TPH as well as the priority pollutants.

This fact sheet is specific to the analysis and development of cleanup levels for TPH. DEQ defines three ranges of TPH:

Gasoline range (GRO) >C6-C10
Diesel range (DRO) >C11-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 which they



occur. DEQ's TPH cleanup levels are based on the mobility of the constituents and relative toxicity of the hydrocarbon ranges. Cleanup levels vary according to residential or industrial scenarios.

Analytical Methods

To ensure consistent data quality, DEQ requires data from laboratories certified by the State of Oklahoma or the National Environmental Laboratory Accreditation Conference (NELAC), or equivalent. DEQ recommends Texas method 1005 for use in preliminary characterization of soil. Oklahoma GRO 8020/8015M and Oklahoma DRO (8000/8100M) can also be used, but since they do not read in the lube oil range, these are not the preferred methods. The Texas 1005 method is not recommended for analysis of ground water because it has higher detection limits than the Oklahoma methods.

DEQ has three Tiers of TPH cleanup levels. Generic Tier 1 TPH, Tier 2 TPH based on the three TPH ranges (see tables below) and Tier 3, a site specific

approach which includes using Texas Method 1006 to determine which aliphatic or aromatic fractions are present. For more information, contact the DEQ Land Protection Division Risk Team at 405-702-5100 regarding Tier 3 methodology before attempting to

develop site specific cleanup levels. DEQ needs to approve all assumptions and inputs for site specific determinations. Use of any level beyond Tier 1 residential is considered a risk based remediation and for DEQ approval, a deed notice is required.

Tier 1

Tier 1 Generic Cleanup Levels	Ground water	Soil
RESIDENTIAL	1.0 mg/L	50 mg/kg
INDUSTRIAL	1.0 mg/L	500 mg/kg

Cleanup to any level other than unrestricted residential use (Tier 1 residential) requires DEQ approval and a deed notice.

Tier 2

Generic Cleanup Levels		Ground water (mg/L)	Soil, Top 2 feet (mg/kg)	Soil > 2 feet (mg/kg)
RESIDENTIAL	GRO (C6-C10) DRO (C11-28) Lube Oil (>C28)	*1.0	*50	*500
INDUSTRIAL	GRO (C6-C10) DRO (C11-28) Lube Oil (>C28)	*1.0	500 2500 5000	

*Total of all the ranges. Cleanup to any level other than unrestricted residential use (Tier 1 residential) requires DEQ approval and a deed notice.

Tier 3, Site Specific

1. Determine the specific fractions of TPH present, aliphatic and aromatic, using Texas Method 1006.
2. Utilizing published, peer reviewed values, determine toxicity values for the specific fractions of TPH present.
3. Consult with DEQ to determine appropriate risk assumptions and inputs.
4. Calculate clean-up goals utilizing EPA Risk Assessment Guidance for Superfund (RAGS).
5. Cleanup to lower levels based on visual staining or odor may be required if those conditions compromise the aesthetic value or use of the site.



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