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Lancaster Laboratories Environmental

1,4-Dioxane in Environmental Samples

1,4-dioxane is a synthetic industrial chemical that is miscible in water. Its main application was as a stabilizer compound in common solvents such as TCA, and was used to enhance solvent life and prevent decomposition from light, heat, oxygen, and acids. Solvents used in metal cleaning, degreasing, electronics, and many other applications may have contained 1,4-dioxane. It can be found in lacquers, paints, oils, and plastics, and as an impurity in antifreeze and airplane deicing fluids.

EPA has listed 1,4-dioxane as a probable human carcinogen; however, there is little information available on the long-term effects on human health. Although 1,4-dioxane is listed as a volatile compound in SW-846 8260B and the Appendix IX list of compounds, EPA currently has 1,4-dioxane listed as a semivolatile in the Target Compound List (TCL) SOM02.2, published in 2014. Originally, EPA listed 1,4-dioxane as a volatile in SOM01.1, after historically not being included in the TCL. EPA has continued to not include it in the Priority Pollutant List (PPL), thus site investigations and remedial designs may have failed to account for its presence.

Regulations

The EPA classifies 1,4-dioxane as an emerging contaminant due to renewed interest in evaluating and investigating potential impacts, as new techniques for testing have become available.
It is included in the Unregulated Contaminant Monitoring Rule (UCMR3) but a Maximum Contaminant Level (MCL) for drinking water has not yet been established. EPA has issued a health-based advisory level of 0.35 µg/L for drinking water.

Risk-based screening limits will vary, depending on your regulator or state agency. Check with your regulator to determine what specific action limit will be applied to your project.

Why Choose Eurofins Lancaster Laboratories Environmental?

- Our large inventory of instrumentation along with full-time staff available 24/7 ensures timely reporting to meet project schedules and ability to accommodate any size project.
- Our comprehensive scope of certifications and accreditations, along with the ability to gain additional certification where applicable, enables us to perform work anywhere a project is located.

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- With 100,000 square feet of laboratory space and a staff of more than 300, we can provide the full scope of environmental testing to support your project.

Our Capabilities

Due to the high solubility and polarity of 1,4-dioxane and the variety of matrices potentially impacted including groundwater, wastewater, soil, and sediment, there are multiple approaches to the analysis of this compound. Eurofins Lancaster Laboratories Environmental offers several methods for analyzing for 1,4-dioxane designed to meet the data quality objectives of your project.

SW-846 8260 Full Scan Mode
While a traditional GC/MS 8260 analysis can be used, reporting limits are typically higher and relative response factors may not meet your needs. However, the analysis can be combined with other typical VOC testing reducing the need for an additional, separate sample collection and analysis:

25-mL purge

Method Detection Limit (MDL)	20 µg/L
Limit of Quantitation (LOQ)	100 µg/L

5-mL purge

Method Detection Limit (MDL)	70 µg/L
Limit of Quantitation (LOQ)	250 µg/L

Soil

Method Detection Limit (MDL)	70 µg/kg
Limit of Quantitation (LOQ)	250 µg/kg

SW-846 8260 Selected Ion Monitoring (SIM) with Isotope Dilution
This GC/MS purge-and-trap method is available for water samples only. It offers improved sensitivity and response by using a heated purge and trap, operating the mass spectrometer in SIM mode, and utilizing a 1,4-dioxane-d8 internal standard. With this analysis method we can achieve:

Method Detection Limit (MDL)	0.2 µg/L
Limit of Quantitation (LOQ)	0.4 µg/L

SW-846 8270 Full Scan Mode
This method consists of the solvent extraction of 250-mL of sample followed by a GC/MS analysis. It provides the economic benefit that 1,4-dioxane can be added to any Semivolatile Base Neutral analysis at no additional charge and achieves:

Water

Method Detection Limit (MDL)	1 µg/L
Limit of Quantitation (LOQ)	5 µg/L

Soil

Method Detection Limit (MDL)	100 µg/kg
Limit of Quantitation (LOQ)	330 µg/kg

SW-846 8270 SIM Mode
This option results in the lowest reporting limits available. This approach requires a second, separate instrumental analysis from the traditional semivolatile run.

Water

Method Detection Limit (MDL)	0.05 µg/L
Limit of Quantitation (LOQ)	0.2 µg/L

Soil

Method Detection Limit (MDL)	0.7 µg/kg
Limit of Quantitation (LOQ)	1.7 µg/kg

Additional analysis options are available to meet your specific application. Please contact Eurofins Lancaster Laboratories Environmental at 717-656-2300 for details.

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