

Analyzing Analytical Laboratory Results: An Environmental Practitioner's Perspective

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Abstract

This paper describes a study of the variation in measured total extractable hydrocarbon (TEH) concentrations among soil sub-samples removed from standard 125-mL glass jars. It aims at addressing the frequently observed discrepancies in laboratory chemical analysis results from ordinary and duplicate soil samples. It also investigates if a modified laboratory sub-sampling procedure using a jar template would yield a more representative TEH concentration in soil samples. Through the study, it was determined that TEH concentrations may vary up to 200% within a soil sample contained in a standard sample jar, making laboratory sub-sampling a potentially large source of error in the measurement process of soil samples. It was also determined through statistical analysis that the proposed grid sub-sampling procedure and the current haphazard sub-sampling procedure employed in laboratories did not yield significantly different analytical results. The magnitude of TEH method specific measurement uncertainties, on average, accounted for 41% of the TEH analytical value. This brought into question the analytical method suitability and the application of measurement uncertainties to single-value regulatory criteria for environmental practitioners.

Keywords: chemical analysis; representative; measurement uncertainty; sub-sampling; statistics; hydrocarbons

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