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Rapid Field Analytical Methods for Total Petroleum Hydrocarbons

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Paper presented at the SPE Asia Pacific Health, Safety, Security, Environment and Social Responsibility Conference, Kuala Lumpur, Malaysia, April 2017.

Paper Number: SPE-185195-MS

https://doi.org/10.2118/185195-MS

Published: April 03 2017

Abstract

Total Petroleum Hydrocarbons (TPH) in soil is often measured to determine if soils have been impacted by crude oil. PT. Chevron Pacific Indonesia (CPI) operates several oil fields in Sumatra and samples soil for TPH content for remediation-related work. Traditional laboratory methods used to analyze for TPH in soil require three to four days, and commercial labs often take two to four weeks before reporting results. This timing results in delays in decision-making regarding site soil delineation and excavation as well as in determining when soil remediation has been completed. CPI conducted two pilot studies using commercially available rapid TPH test kits and one non-destructive infrared method. In the first pilot study, six different commercially available field test kits were evaluated for rapid TPH analysis plus a modified FTK (field test kit) with infrared method. Each test method was used to measure TPH from 63 soil samples. These samples covered a wide range of soil type, oil content, and moisture content, and should, therefore, be representative of most CPI sites. The TPH results were compared to the standard TPH analytical method, TPH-Gas Chromatography (TPH-GC) (USEPA 8015). In the second pilot study, a portable handheld infrared (IR) Instrument was tested with over 300 soil samples from variable CPI sites. The standard TPH-GC analytical method data of those soil samples were used to create two site-specific models with 15-20 double-blinded samples to validate the modeling work. The validated models will be loaded onto the individual instrument for future field deployment.

Two of the six commercially available test methods produced TPH results similar to those obtained by the standard laboratory TPH-GC methods. The rapid, portable IR method also provided TPH results that correlated well with standard TPH-GC results at different concentration levels. The advantage of the rapid IR method is that the soil samples do not have to be extracted with a solvent, so no chemical waste is generated. The rapid IR method provides

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TPH results in a few minutes rather than in days or weeks. This paper describes the results from the two pilot studies, and the pros and cons of each rapid method for field application are discussed.

Keywords: remediation, drilling fluid selection and formulation, drilling fluid chemistry, drilling fluids and materials, correlation, Field Measurement Technology, analytical method, field analytical method, land reclamation, Upstream Oil & Gas

Subjects: Drilling Fluids and Materials, Environment, Information Management and Systems, Drilling fluid selection and formulation (chemistry, properties), Remediation and land reclamation

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