Real-Time Total Petroleum Hydrocarbon (TPH) Measurement Enables the Rapid Environmental Remediation Workflow

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Background/Objectives. Total petroleum hydrocarbons (TPH) in soil are often measured to determine if soils have been impacted by crude oil. Chevron Pacific Indonesia (CPI) operates several oil fields in Sumatra, and during site decommissioning, soil samples must be analyzed. Traditional laboratory methods require three to four days to analyze for TPH in the soil, 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.

Approach/Activities. CPI, therefore, conducted two pilot studies using a commercially available, portable handheld infrared (IR) instrument for testing over 500 soil samples from variable PT. CPI sites. These samples covered a wide range of soil type, oil content, and moisture content, and were representative of most PT. CPI sites conditions. The standard TPH-GC analytical method data of those soil samples were used to create three site-specific models with 15-20 double-blinded samples to validate the modelling work. The validated models have been loaded onto the individual instrument for future field deployment. The rapid, portable IR method also provided TPH results that correlated well with standard TPH-GC results at different concentration levels with variable accuracy. The instrument has been deployed into excavation work first to resolve the immediate need for quick decision making. Variable field settings have been developed to accommodate variable locations and sample volume. A quality monitoring program has been set up to cross-check the robustness of the models on the monthly base. Upon the further upgrading of the RemScan, it has been deployed to delineation work in 2018 as well to increase high-quality data collection for a better site assessment work.

Results/Lessons Learned. The advantage of this rapid IR method is that the soil samples do not have to be extracted with a solvent, so no chemical wastes are generated. The rapid IR method provides TPH results in a few minutes rather than in days or weeks. This paper summarizes the field deployment results and sharing the lessons learned. Potential cost savings can be more than 100,000 US$ in a scenario where 3000 samples are analyzed per month.