

In-situ determination of PCB contamination in soils from a former electrical facility by an enzyme immunoassay method – *Ensys™ PCB Soil Test kit*

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Synopsis

The *Ensys™* PCB soil extraction and Soil Testing kits were successfully used to undertake an in-situ semi-quantitative assessment of the remaining levels of 2 polychlorinated biphenyls (PCB) arochlors (1242, 1254) in soils from former electrical transformers factory.

Background

The site had been previously used for the filling of transformers with PCB-oil and it had been later redeveloped for commercial purposes. An area of ground was identified as being heavily contaminated with arochlors 1242 and 1254. The materials were excavated and disposed off-site. Subsequently, the underlying soil required to be validated to ensure all contaminated materials had been removed. However, disruption to the site's activities needed to be minimized hence quick analysis turnaround was crucial to this project.

Methodology

The *EnSys™* extraction kit was used for the extraction of PCB in sandy clay and chalk soil samples. The extraction consisted of transferring 10.0g of soil into an extraction jar and adding 20ml of methanol. The contents were shaken vigorously for 2min and allowed to settle, so approx. 1-2ml of extract could be obtained. The extract was then filtered and subsequently used in the determination of PCBs.

The *EnSys™* PCB soil test kit was used for the determination of 2 arochlors: 1254 and 1242, at a level of 0.5mg kg^{-1} and 10mg kg^{-1} , respectively. The analysis comprised a series of dilutions and reagent additions, which allow for the reaction of PCB-molecules with a limited number of antibodies which are immobilized within a testing tube. After an incubation period of 10min, the tube contents were emptied and the tubes were washed.



Key Advantages

- Rapid results
- High level of accuracy
- Multiple detection levels

A chromogenic substrate was added and colour development was allowed for a period of 2.5min. After this period, a visual and photometric interpretation was undertaken.

Results and Conclusions

Soil samples with PCB concentrations higher than 0.5 and 10mg kg^{-1} were effectively determined in-situ. This allowed for the identification of residual contaminant hotspots and provided reliable evidence that the remaining materials on site did not contain PCB levels above the established PCB targets deemed suitable for the site. Most importantly, the methodology allowed a fast project turnaround which led to minimal disruption to the site's activities.



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