

Bioremediation

Remediation

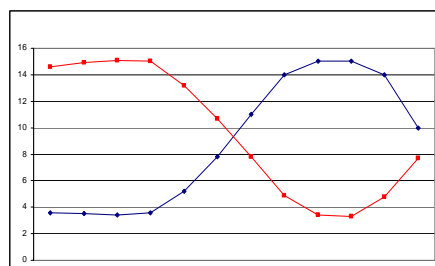
Ex-Situ Bioremediation – East Anglia

Ecologia were asked by 3R to provide bioremediation services for the treatment of 1,500 cubic metres of hydrocarbon contaminated soils at a Persimmon Homes development. The soils had already been subject to 'bioremediation' by another contractor but the contaminant concentrations had not changed due to non-aeration of the soils. This case study highlights the need to engineer bioremediation to allow the effective removal of factors that are limiting the natural degradation of the hydrocarbons and what can be achieved when it is done correctly.

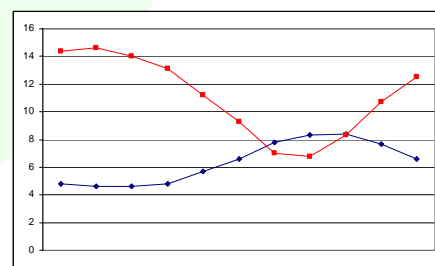
Ecologia constructed a biopile using the ReMoVex process that allows continuous aeration of the soils, adequate nutrient supply for indigenous bacteria as well as VOC and leachate capture and treatment. The ReMoVex process is a closed system. No organic amendments were added.

During the 14 week remediation the hydrocarbon concentration of the soils was reduced from in excess of 12,000 mg/kg to below 500 mg/kg. Ecologia monitored the soils on a fortnightly basis using composite sampling techniques to provide a robust representation of the soils.

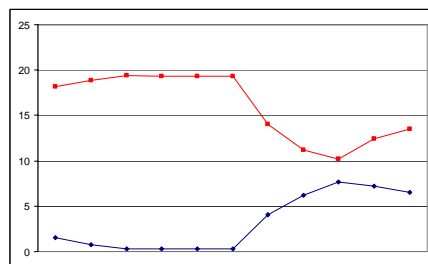
In addition to standard chemical analysis Ecologia used automated on site temperature and soil gas analysis to provide verification data via a telemetric link. The temperature of the biopile increased rapidly during the first three weeks to an optimum of 35-38 degrees centigrade from around 10 degrees when the biopile was constructed. This temperature increase clearly demonstrates that biological activity was stimulated without the need for organic amendments such as wood chips. The gas monitoring allowed respiration tests to be conducted automatically. The blower was switched off line, removing the aeration capability, and the oxygen and carbon dioxide soil gas concentrations were monitored every five minutes for 11 hours. The results from the respiration tests show the strong activity of the aerobic biological consortium in the soils and were used to predict the end point of the remediation. The respiration test charts below show how the rate of biological activity changed during the treatment (oxygen is red and carbon dioxide is blue). At the start of the project the oxygen is utilised rapidly after the blower is switched doff line and carbon dioxide is produced rapidly, whereas towards the end of the project the rate slows, indicating that the process is nearing completion.



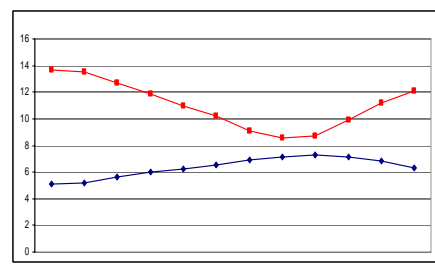
2 weeks



5 weeks



10 weeks



13 weeks

The treatment was completed on time and to budget under a 100% fixed priced contract.