



# *Jones Environmental Forensics*

## **Ageing Petrol Spills**

Petrol is difficult to age as it evaporates very quickly. Many factors have to be taken into consideration in order to build up as much evidence as possible to make an informed decision. One age estimate is unlikely to be conclusive, so several different formulas and ratios should be used. A sample of fresh petrol obtained directly from a retail pump is necessary to establish a baseline for comparisons.



Several age estimating formulas and ratios can be used including:

- Kaplan's calculation – where  $R_b = B+T/E+X$  using BTEX values.
- Chemical profiling including iso-butane, n-butane, iso-pentane and n-pentane
- $nC_7/MCH$  (methylcyclohexane) ratio, where MCH increases with weathering.
- Knowledge of half life of BTEX compounds.
- Ratios of benzene/toluene

In ground-waters, benzene diffuses most rapidly out of the free phase petrol and partitions into the water, followed by toluene, ethylbenzene and xylenes. The reverse occurs with BTEX in soils. Aging petrol spills in soils and waters is only possible where sufficient concentrations are present.

### **Case Study**

A major retailer had relinquished a petrol station several years ago and needed to prove the petrol in a monitoring well was less than 12 months old. The petrol in the well had been significantly weathered, and losses reported by various calculations suggested an average of 60-70% weathering. The cumulative BTEX ratio  $R_b$  (Kaplan) estimated the age of release to be 2-5 years. However by using a combination of various age estimating formulas and ratios, the presence of gases and proportions of BTEX, the age of release was considered to be recent and within 6 months. Illustrating that a single age estimating formula can be misleading.



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