



# CORAT Analysis

Compound Ratio Analysis Technique

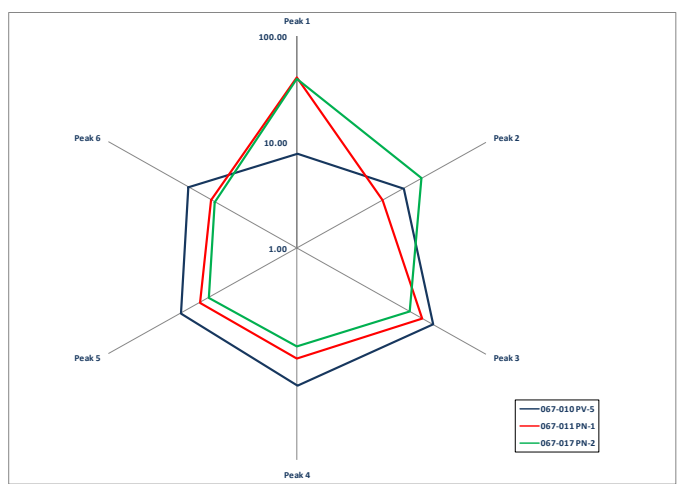
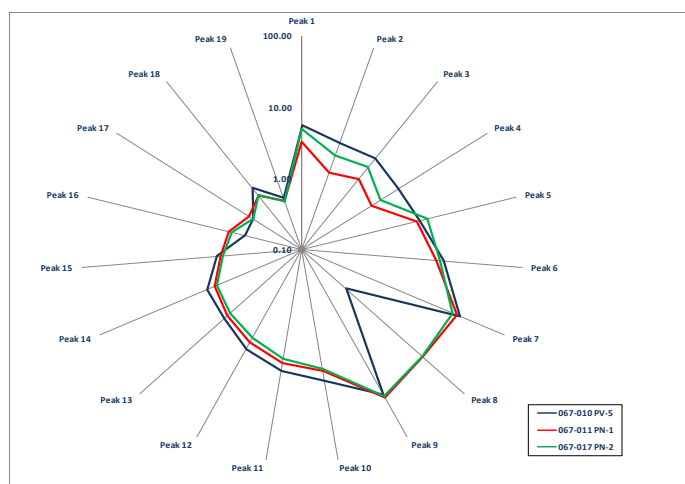
Star or polar plots are a common statistical method for displaying multivariate data with each star representing a single observation (or sample). Each spoke on the star represents a variable or ratio of two variables and can contain between 4 and 24 points.

Star plots constructed using individual compounds or peak ratios maximizes the apparent differences between samples by stripping away what the samples have in common and focusing on how they differ. To maximize the use of star plots in environmental forensics the choice of compounds and/or ratios is critical and is based on experience. Originally developed by Chevron in the US for crude oil comparison, Jim Jones pioneered the use of Compound Ratio Plots for petroleum geochemical use in the UK in 1990, and it is his expertise that enables Jones Environmental Forensics to use them for environmental samples.

Any semi-volatile analysis that produces a chromatogram can be plotted. Although volatile compounds can be plotted, the rate of evaporation/weathering can make the plots unreliable.

Forensic tier 2 analysis usually includes the following alkylated series which can be plotted: phenanthrene, naphthalene, dibenzothiophene, alkylcyclohexane, n-alkane and sesquiterpane. Biomarkers (hopanes and steranes) can also be plotted if it is felt that these are useful for correlation.

For correlation to source, it is usual to plot the whole oil (product) sample and a selection of the alkylated series and, for general correlation, the samples of interest are plotted together illustrating both differences and similarities.



Two CORAT plots illustrating similarities between samples 11 and 17 (red and green) and differences from sample 10 (blue).