

PCB Problems...Without PCBs

PCB data from USEPA Methods 608 and 8082 can be false positive when non-PCB compounds that respond to Electron Capture Detection elute within the retention time windows for actual PCB compounds. Many non-PCB compounds exhibit this behavior, such as chlorinated naphthalenes, chlorinated paraffins, and even compounds containing no chlorine at all. Since there are up to 209 individual PCB peaks in chromatograms of actual PCB mixtures, there is ample opportunity for “false positive” results due to mis-identification of non-PCB peaks.

Case 1. Background and Problem

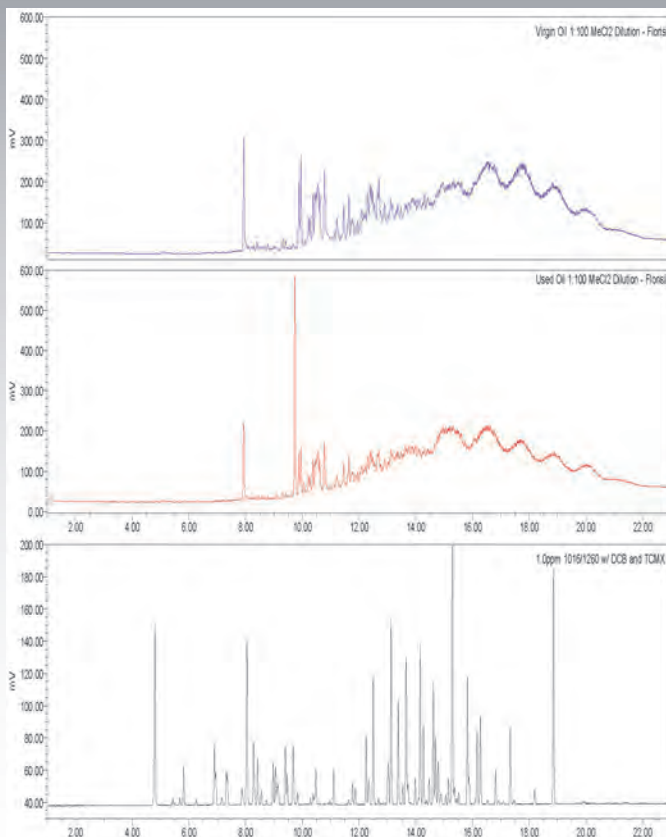
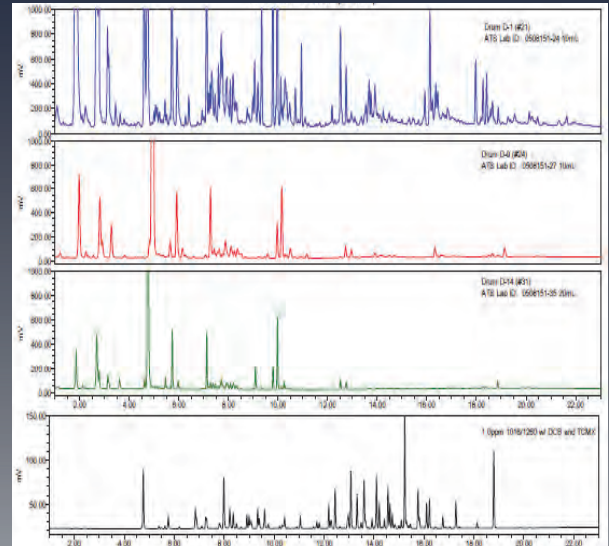
The chromatograms to the right represent three used oil samples that tested positive for PCBs using USEPA Method 8082.

They were reported by the contract laboratory as having several hundred parts per million (ppm) Aroclors 1242 and 1260, when in fact **NO PCBs** were actually present in these samples.

Implications to Client

These “false positive” results were Notices of Violation (NOV) from the waste oil hauling company to the generator, a liability lawsuit claiming the generator facility had violated the Toxic Substances Control Act (“TSCA”) and was responsible for clean-up costs associated with removing this “PCB contamination” from the waste oil processing/disposal facility.

The lawsuit claimed liability costs of several hundred thousand dollars associated with clean-up of the waste oil processing facility, plus an approximately equal amount for legal fees.



Case 2. Background and Problem

In another circumstance involving used oil, a contract laboratory reported PCBs in excess of 500 ppm, obligating TSCA reporting for wastes that required incineration. The generator facility had no history of PCB contamination of its used oil streams for decades. Nonetheless, a second contract laboratory confirmed this result.

The generator facility sent a “blinded” sample of virgin lubricant to the two contract laboratories, and they both confirmed the greater than 500 ppm PCB result. The problem was, this virgin lubricant was a high-tech product from an American lubricant formulator, who could not possibly have incorporated PCB compounds into their formulation because of the TSCA prohibition against such use, Federally prohibited since 1978.

This turned out to be a “false positive” problem with USEPA Method 8082, arising out of non-PCB peaks being included in the PCB quantitation, as illustrated in the chromatograms to the left. In actuality, there were **NO PCBs** in the virgin lubricant, and there were **NO PCBs** in the used oil either.

Solutions for PCBs...Without PCBs

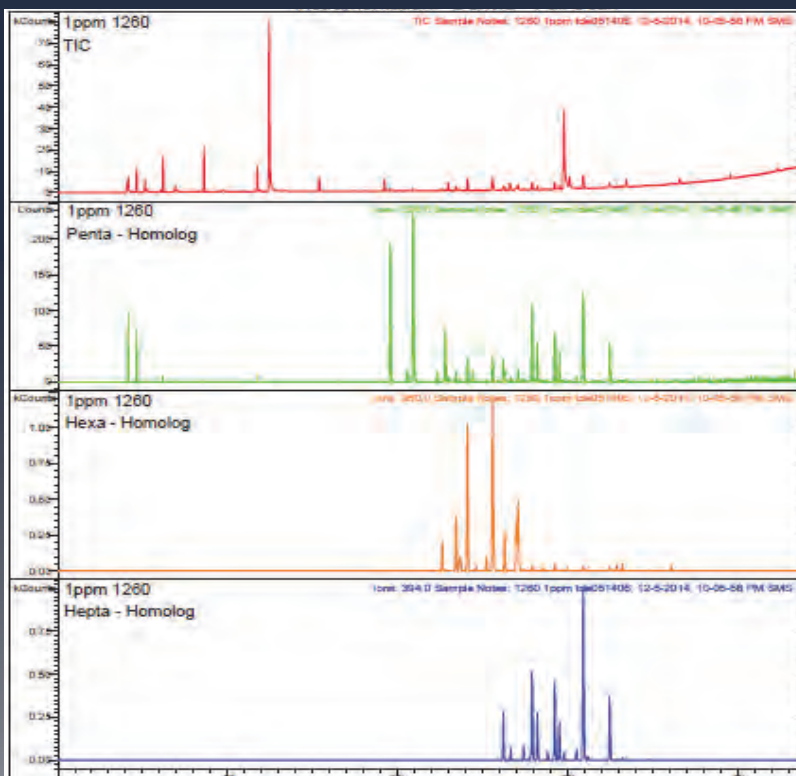
Resolution

In both illustrated cases, the “false positives” were resolved by employing a confirmatory method, as specified in USEPA Method 8082.

USEPA Method 680, a confirmatory method based on Mass Spectrometry (MS) detection, confirmed that peaks showing up by Electron Capture Detection were NOT PCBs.

Conclusions

None of the peaks detected in these samples were attributable to PCBs, illustrating the importance of employing confirmatory methods in the event that USEPA Method 8082 or Method 608 results indicate the presence of PCBs.



In-house Analytical Capabilities

Analytical Services

- Sediments and soils
- Water and wastewater
- Air testing
- Method development
- Bench scale studies

Tools

- Gas chromatography tandem mass spectrometry (GC/MS/MS)
- Two-dimensional gas chromatography/mass spectrometry (GCxGC/MS)
- Liquid chromatography/tandem mass spectrometry (LC/MS/MS)
- Isotope dilution quantitation

Specialization

- Alkylated polycyclic aromatic hydrocarbons and petroleum biomarkers
- Petroleum hydrocarbons
- Trace metals speciation
 - e.g., As, Hg, Cr
- Polychlorinated biphenyl (PCB)
 - Aroclors, homologs, congeners
- PCB replacement compounds
 - Santosol, MIPB, and PCT
- 1,4-Dioxane
- Chlorinated dioxins and furans
- Pesticides and herbicides
- Emerging contaminants of interest
 - e.g., PFC, BPA, triclosan, glyphosate