

## Determination of ACCUTRACE™ Plus fuel marker using GC-FID

- European diesel fuel marker obliged per 18 January 2024
- Simple & robust alternative for GC-MS method
- Proven performance

**Keywords:** low taxation mid-distillates, heart-cut technology GC-FID, ACCUTRACE™ marker



### Introduction:

By Official Decision of the European Commission, as of 18 January 2024 the common fiscal marker for gasoil and kerosene will be ACCUTRACE™ Plus of DOW. This is related to the lower taxation of for example heating, farming, and fishing fuels.

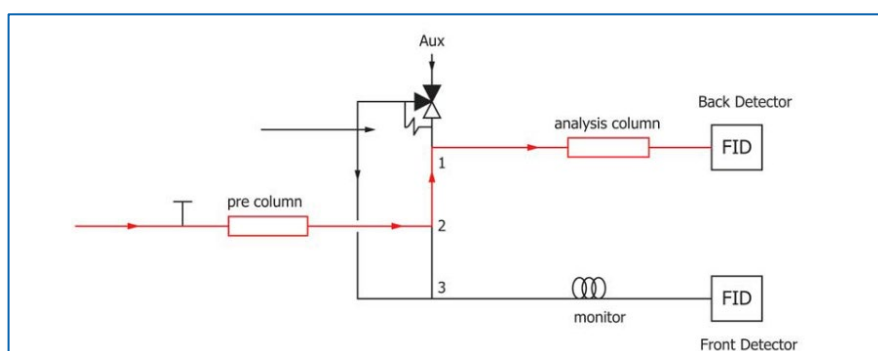
The EU Member States are working on national regulations for the blending levels of the marker as well as the methodology to check for fraud. DOW, as the manufacturer of this chemical marker (butoxy-benzene (CAS #1126-79-0, a patented, colourless product, also known as Butyl Phenyl Ether or BPE) advises the use of a GC-MS method for this.

The legally required ACCUTRACE™ Plus blending levels for the fuels which may have a lower taxation level, are in the range of 12,5 – 18,75 mg/liter (this is the so-called 100% level). In the field, the actual blending of the marker is controlled by volumetric instruments and is checked on a case-by-case basis at the refinery or terminal.

The measurement range should however also cover lower concentrations as product with and without marker may be blended. So, in practice one should be able to measure concentration at around 0.1 – 0.2 mg/liter of butoxy benzene, which is around 1% of legal range (100%).

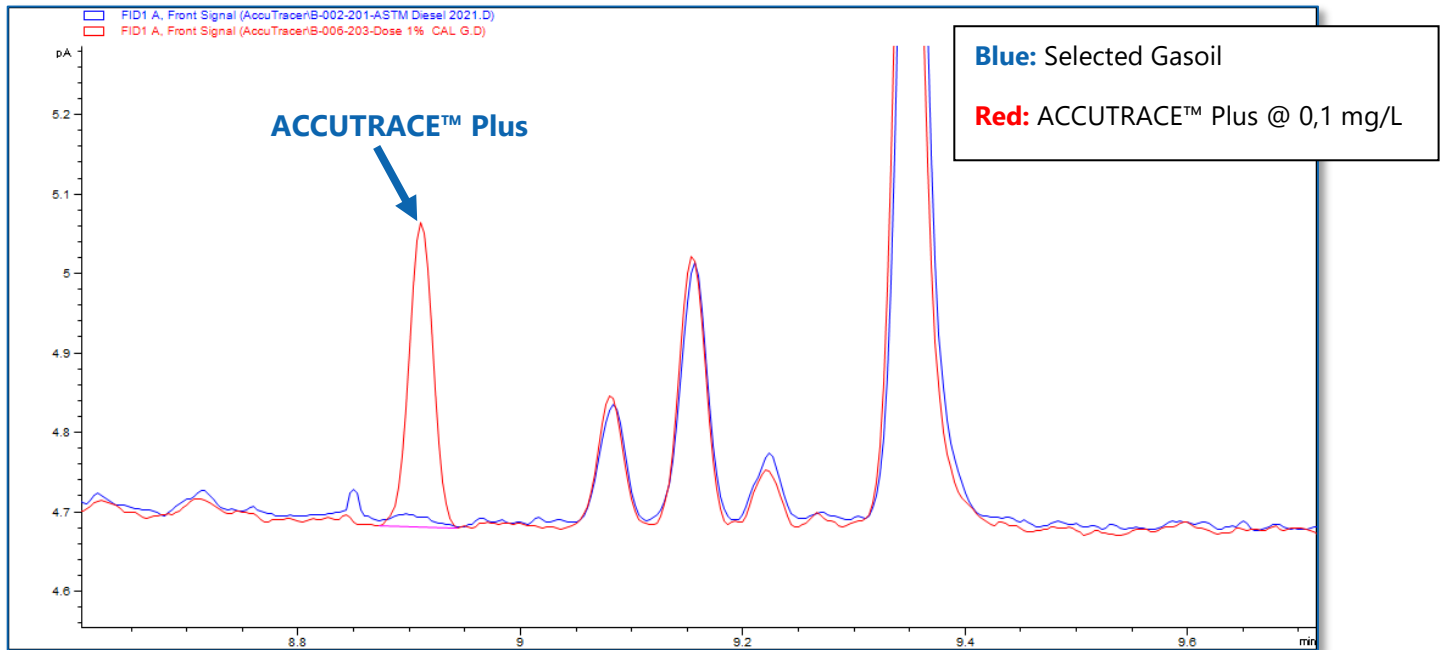
### PAC - AC FUEL MARKER ANALYZER™

Not every facility may be able to use a GC-MS system, PAC has therefor developed a robust and simple GC-FID heart-cut technique for analysing the chemical marker concentration in a variety of mid-distillate products. Typical flow diagram is as shown below.



This heart-cut technique is based on the well-known “pressure switch” concept and is used in various other AC applications for years already. At the moment the component of interest is eluting from the pre-column, the outlet flow of the pre-column is directed to the analysis column for further separation. Resulting in a clear separation of the ACCUTRACE™ fuel marker, whereas the other hydrocarbons are directed to the second column. The heavier fraction, eluting after the ACCUTRACE™ fuel marker, from the first column is send to backflush.

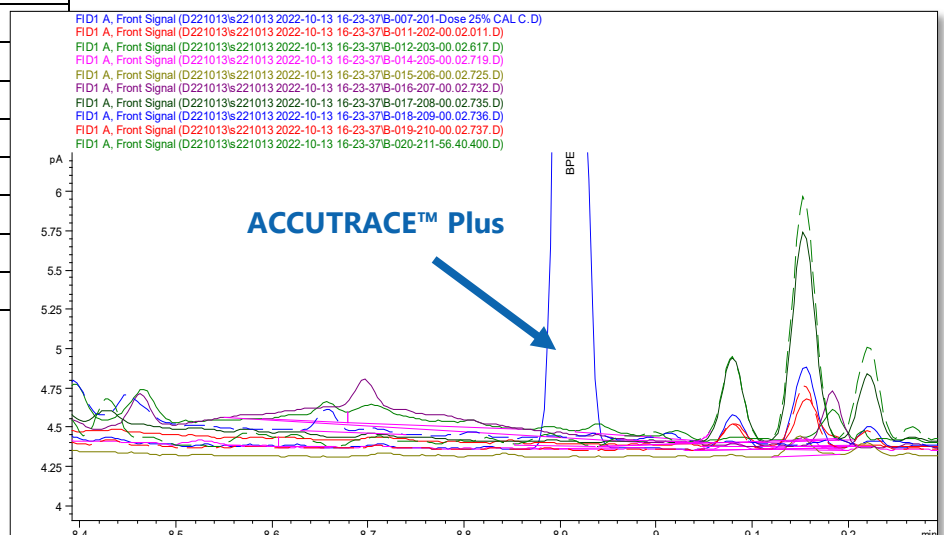
A typical chromatogram of a Gasoil blended with 0.1 mg/l is shown below.



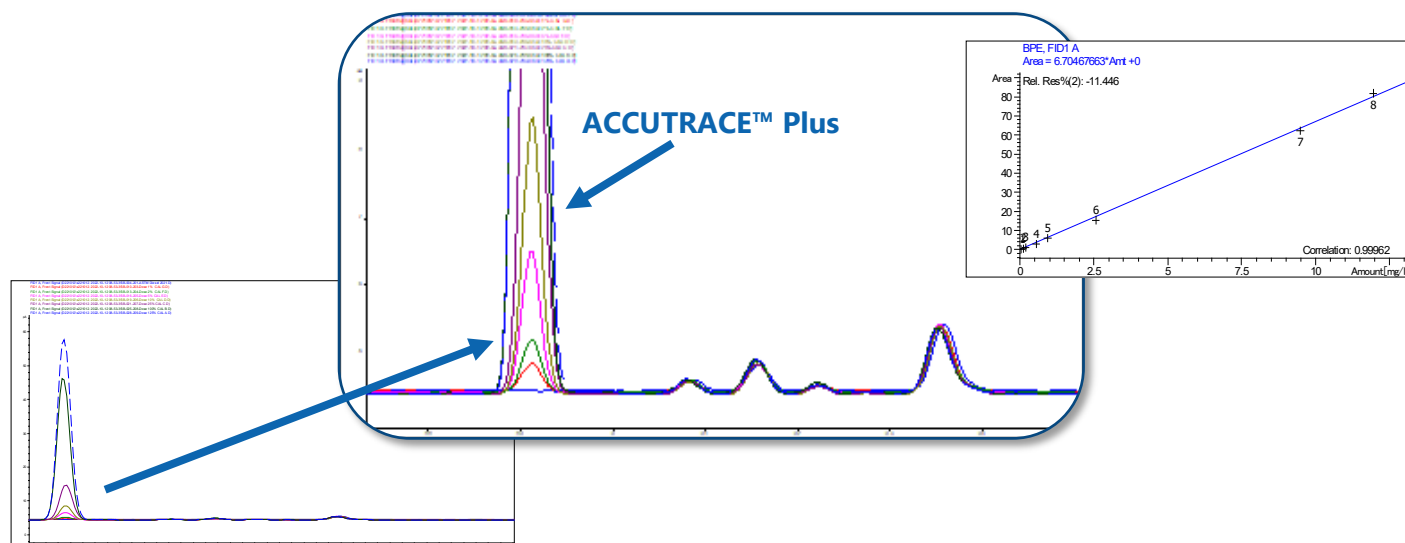
## PERFORMANCE

Selectivity has been validated by analysing a variety of mid-distillate products without ACCUTRACE™ Plus blended to it. As shown in the below graph:

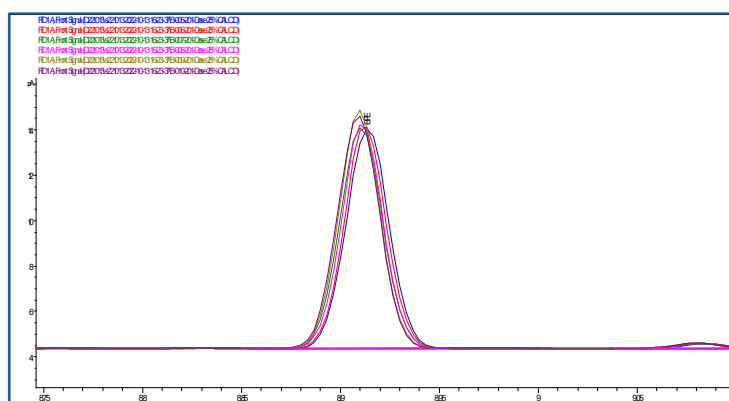
AC part no	Description
	ACCUTRACE™ Plus spiked diesel
00.02.617	Reference 100 ppm FAME In AVTUR
00.02.011	Jetfuel Simdis
00.02.719	PNA in Diesel Reference
00.02.725	MDA Reference Gasoil
00.02.732	QC, Jetfuel, Sulfur
00.02.735	Diesel B7, N, S
00.02.736	Jetfuel, N, S
00.02.737	Heating oil, N, S
56.40.400	Reference Gasoil (140-400 °C)



The calibration based on ACCUTRACE™ Plus fuel marker blended into a gasoil in the range of 0.1 to 10 mg/l (which is the minimal dose) shows a linear response with a correlation coefficient of 0.9996, which is in line with the requirements as listed. See below graphs:



Repeatability has been tested for at a 2.2 mg/l level, showing an RSD of around 2%. See below graph:



## Conclusion

PAC has developed an affordable, robust, and simple application for the analysis of ACCUTRACE™ marker in mid-distillate products that may benefit from lower taxation. Although not allowing qualitative speciation – as GC-MS would do – it meets all other performance requirements in terms of selectivity, repeatability, and reproducibility.

All laboratories that need to test for ACCUTRACE™ marker at 1% to 100% dope level in distillate products can benefit from the AC Fuel Marker Analyzer™ (AC-FMA™) configuration, which complies to the standard method under development at CEN.

**NOTE:** ACCUTRACE(TM) is a trademark of The Dow Chemical Company ("Dow") or an affiliated company of Dow