VOCs Speciation From Steam Boiler Stacks of Industries Located in Naucalpan

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- Carlos Alberto González-Morales, Former Director of Ecology

Activities developed at Naucalpan

- PM10, particle size characterization
  - Results presented in Boulder, October, 2006
- PAHs adsorbed in PM2.5
  - Results presented in Boulder, October, 2006
- VOCs in stacks gases
  - Results presented in Mexico City, May, 2007

Objective

To speciate VOCs in samples of steam stack gases of industries located in the Municipality of Naucalpan.

Relevance

Speciation of VOCs is important:

- **To identify sources of air pollutants**
- **To update emission inventories**
- **To study the dynamics of pollutants in the atmosphere**
- **To estimate possible risks of population exposure.**

Location

- Several air quality studies for the Mexico City Valley have shown that most pollutants are generated at the north west area.
- Naucalpan is located at the north west of the city and is the first largest municipality in number of industries and second in traffic load

Analysis of COVs: Methods

- USEPA T014 for COVs.
- SW-846-010 for aromatics.
- VOST for olefins.
- Analysis: Gas Chromatography-Mass Spectroscopy with FID.

Equipment: Thermo iso-kinetics sampler

Equipment

Materials	Specifications
Teflon hose	SKC, 3/16 , ¼ diameter
Tedlar Bags	SKC, Volume of 1 lt
Particle filter	SKC filter of cellulose ester of 37 mm , 0.8 microns pore
Moisture trap	CaOH / NaOH.

Number of industries sampled

Fuel Type	Number of Factories (B)	Combustion Equipment (A)
LPG	10	Steam boiler
Diesel	10	Steam boiler
CNG	15	Steam boiler
Total	35	

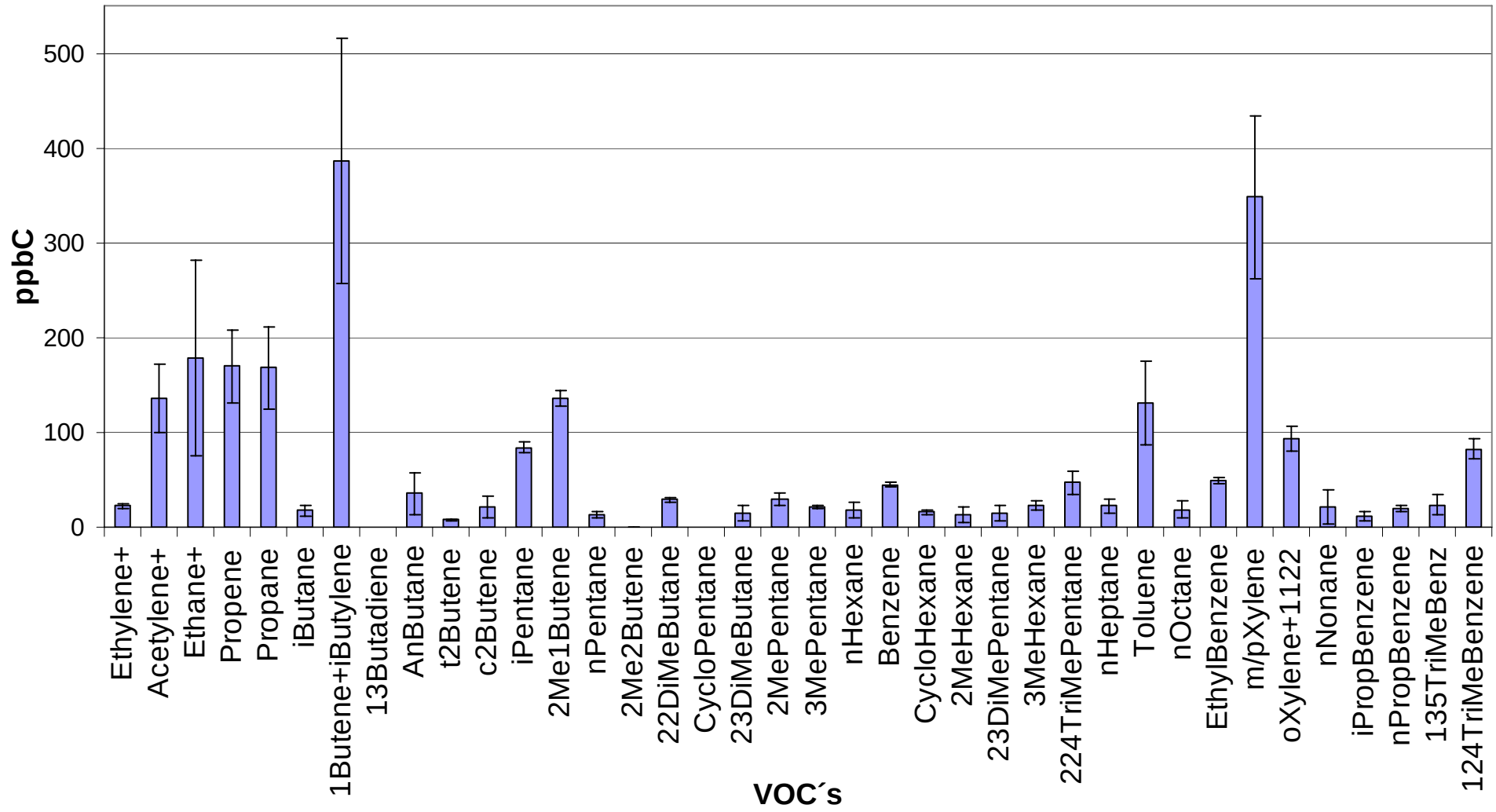
A: Capacity 50-350 C.C

B: The selection of industries was limited by the willingness to participate.

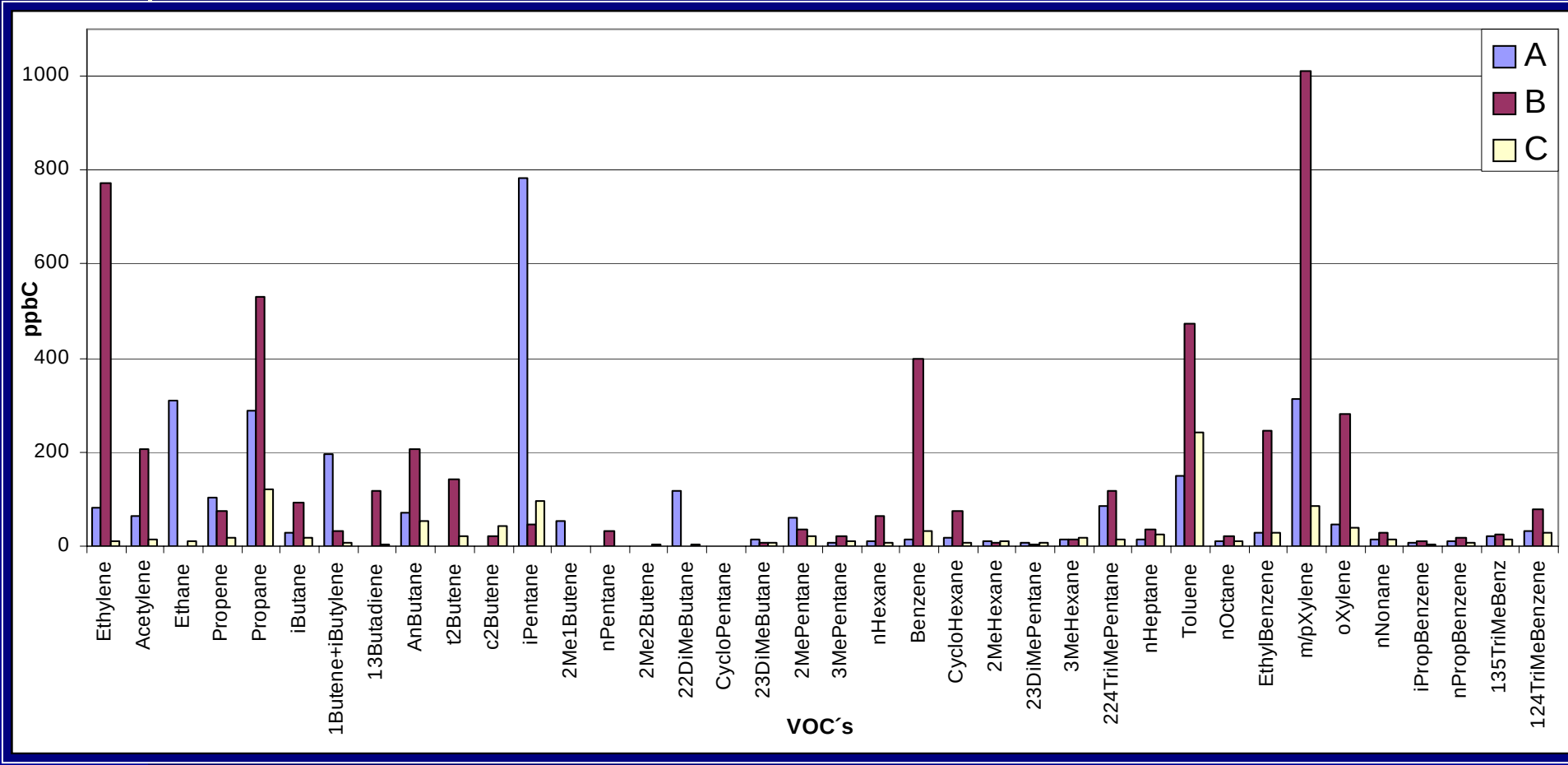
VOCs analyzed

Alcanes		Aromatics	Olefines
Ethane	3-methyl pentane	Benzene	1-heptene
Propane	2,3-methyl pentane	Toluene	Ethylene
n-Butane	2,2,4-tri-methyl pentane	Ethyl benzene	Acetylene
Iso-butane	n-hexane	o-xylene	Propylene
2,2 di-methyl butane	Cycle-hexane	p-xilene	1-butene
2,3 di-methyl butane	2-metil hexane	m-xilene	Trans-2-butene
Isopentane	3-metil hexane	Isopropyl-benzene	1,3-butadiene
n-pentane	n-heptane	1,3,5 tri-methyl benzene	2-methyl-1-butene
Ciclopentano	n-octane	1,2,4 tri-methyl benzene	2-methyl-2-butene
2-methyl pentane	n-nonane	N-propyl-benzene	

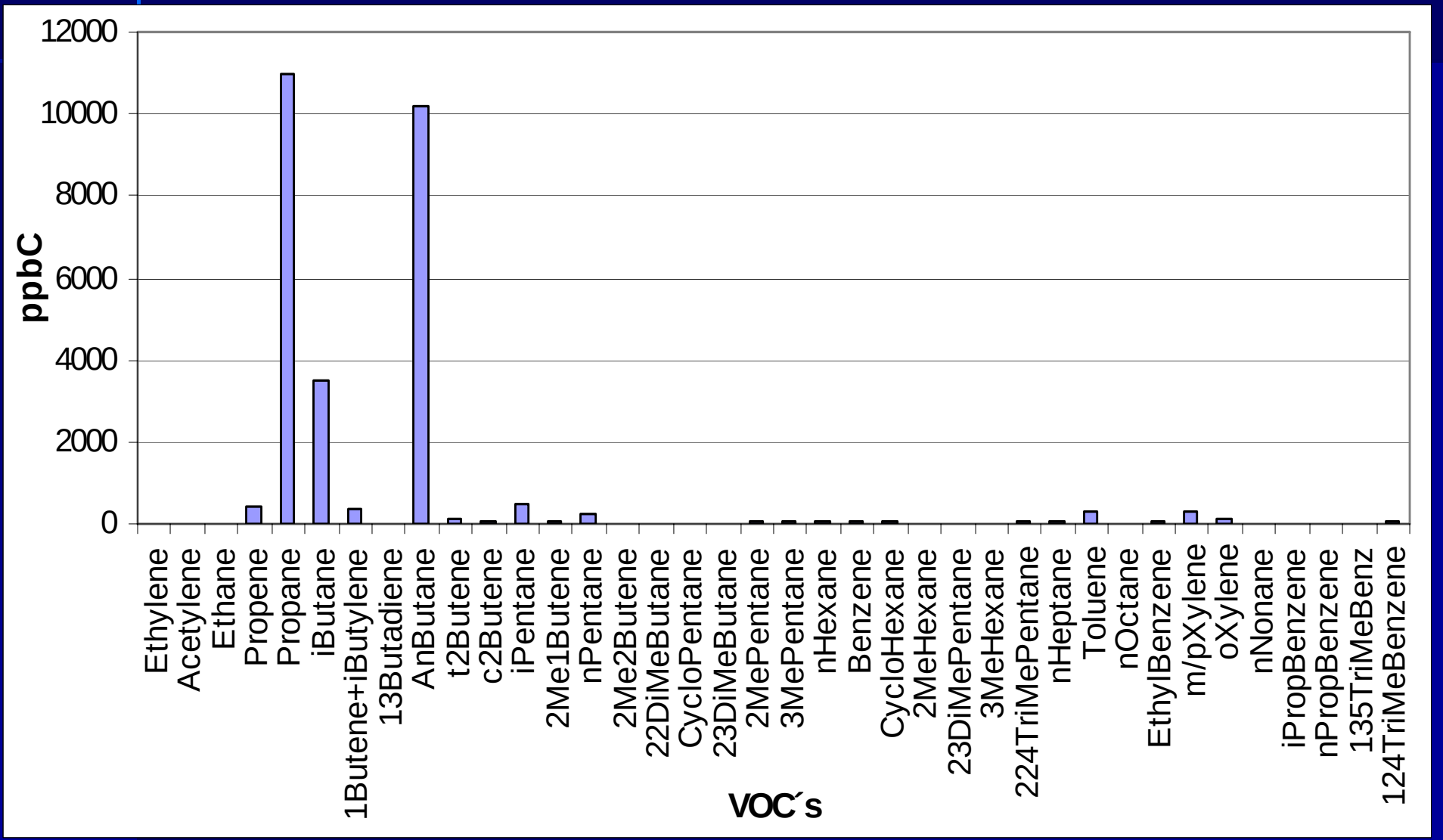
Average Diesel VOCs Emission Profile



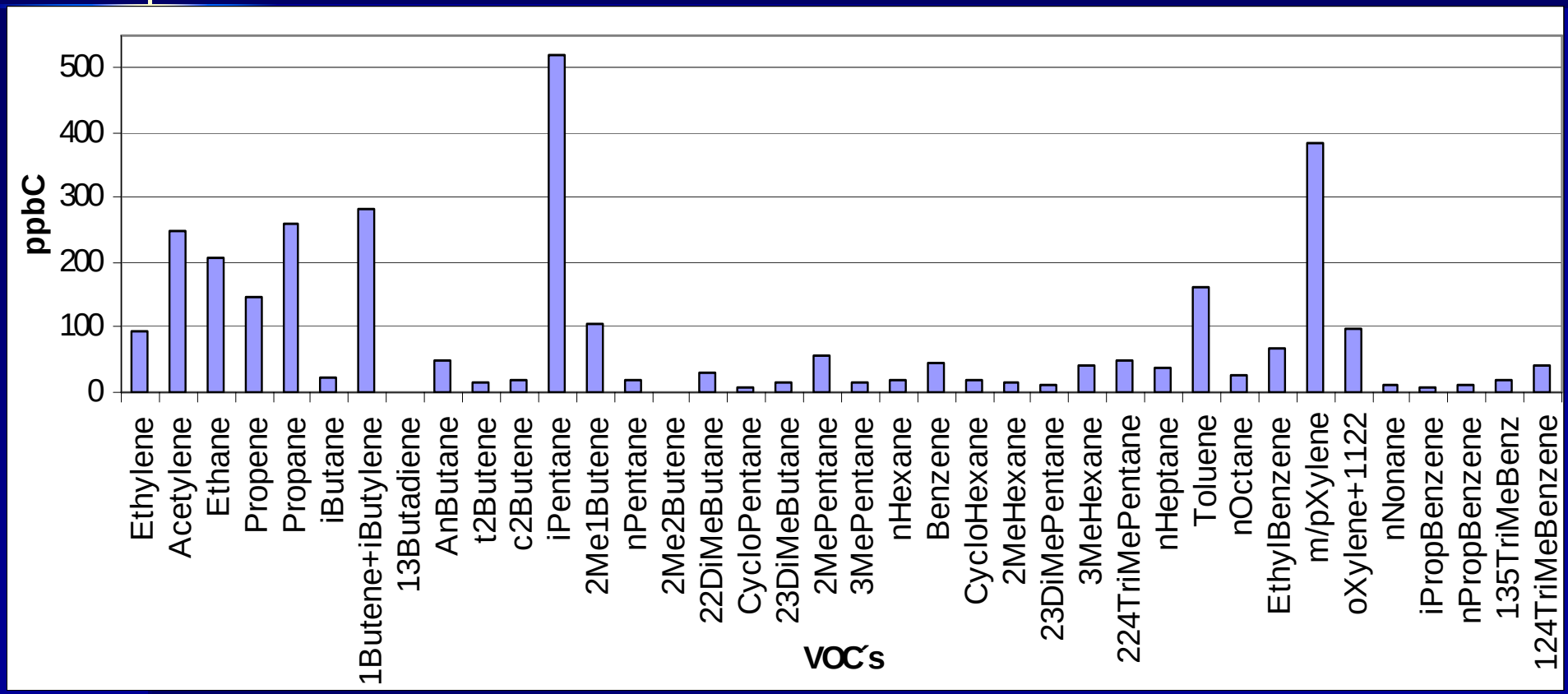
LPG VOCs Emission Profile for 3 industries



Expected LPG VOCs Emission Profile (Analysis of one industry)



Average CNG COVs Emission Profile



Conclusions

- Results of Diesel COVs speciation are consistent and uniform within samples.
- Speciation of LPG VOCs samples are inconsistent, except for one sample. Alkanes with 5 or more carbons and aromatics were detected.
- Speciation of CNGs VOCs are consistent, but it is not the expected profile.
- It is convenient to analyze more sample gases of CNG and LPG combustion to verify the results.