

CARBONYL PROFILES IN VEHICULAR EXHAUST EMISSIONS PRIOR TO THE MANDATED MTBE BAN IN CALIFORNIA.

PART I: A SEPULVEDA TUNNEL EXPERIMENT

Arantza Eiguren-Fernandez, Suresh Thurairatnam, and Antonio H. Miguel*

Southern California Particle Center and Supersite, University of California

Los Angeles, 650 Charles E. Young Dr., Los Angeles, CA, 90095



Background

- Carbonyls are toxic, mutagenic and/or carcinogenic
- Carbonyls play an important role in the atmospheric photochemical ozone formation
- Fuel composition affects carbonyl profiles and emission rates

Objectives

- Measure acrolein and methacrolein (and other carbonyls) with high accuracy using 2,4-DNPH C18 cartridges (Kochi Fung, AtmAA Inc. Calabasas, CA)
- Obtain carbonyl emission profiles in California prior to 31 Dec 03 and after the mandated MTBE ban in California (Part II: Summer '04, Caldecott Tunnel, Berkeley)

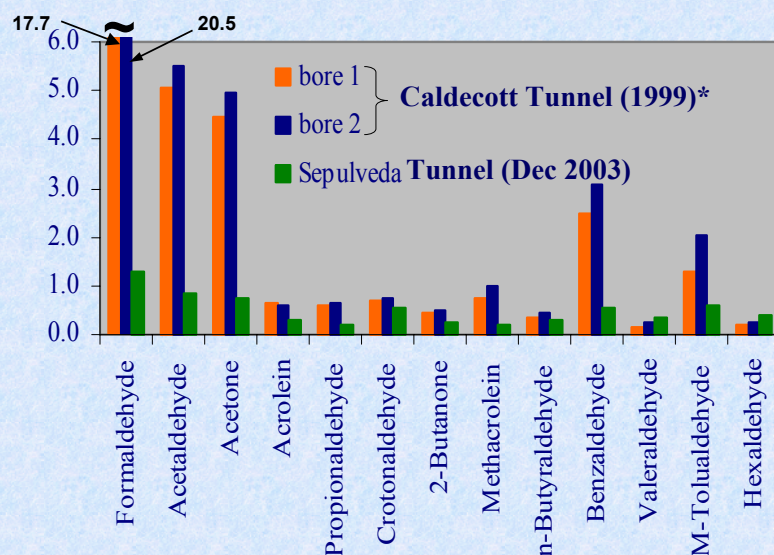
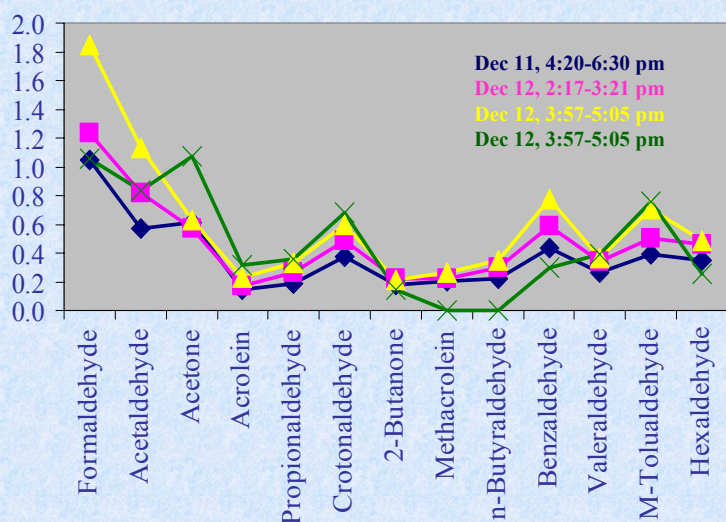
Sampling and analysis

Site: Sepulveda Tunnel, 670 m (under LAX), South exit

Dates: December 11-12, 2003; 1-2 hr samples @ 2 LPM

Extraction "in situ" with acetonitrile immediately after sampling; HPLC-DAD @ 364, Nova-Pak C18, 60 A, 4 μ m, 3.9x150mm, 1mL/min gradient acetonitrile:water:tetrahydrofuran.

Results ($\mu\text{g}/\text{m}^3$) and Major Conclusions



*Sepulveda Tunnel (this study) vs. Caldecott Tunnel (1999)**

* Kean A.J., Grosjean E., Grosjean D., Harley R.A., 2001, Environ. Sci. Technol., 35, 4198-4204

- Formaldehyde, acetaldehyde & acetone: relatively higher levels prior to mandated MTBE ban!
- Valeraldehyde & Hexaldehyde: relatively higher levels after the mandated MTBE ban.

❖ Highest levels: Formaldehyde ($1.84 \mu\text{g}/\text{m}^3$) and acetaldehyde ($1.13 \mu\text{g}/\text{m}^3$) observed during Fri rush period.

❖ Acrolein and methacrolein (up to 0.31 and $0.27 \mu\text{g}/\text{m}^3$) readily quantified.

Acknowledgements

The authors thank Andrew Erman, Staff Engineer, and Tim Ory, staff, Los Angeles Bureau of Street Services, for their help in facilitating access to the Sepulveda tunnel, electric power and safety signs used. This research was supported by the Southern California Particle Center and Supersite (SCPCS, AHM Year 6) US-EPA Grants #R827352-01-0 and CR-82805901.