California Air Resources Board
CNG Meeting
March 7, 2001
Sacramento, California

PRESENTATION OF THE
ENGINE MANUFACTURERS ASSOCIATION

Current Specifications for Compressed Natural Gas*
(Title 13, California Code of Regulations, § 2292.5)

Hydrocarbons

Methane	88.0% (min.)
Ethane	6.0% (max.)
C_3 and higher HC	3.0% (max.)
C_6 and higher HC	0.2% (max.)

Other Species

Hydrogen	0.1% (max.)
Carbon monoxide	0.1% (max.)
Oxygen	1.0% (max.)

Inert Gases

Sum of CO_2 and N_2	1.5%-4.5% (range)

*Values expressed as mole percent

Fuel Specification Impacts Engine Design

- Engines are designed to operate on the fuel specified
  - to assure emission compliance with adequate margin of error
  - to assure customer satisfaction
  - to assure adequate engine performance
  - to assure engine durability
- Engine manufacturers cannot conduct performance/ emission testing on multiple fuel formulations

Range of Engine Manufacturer Specifications for CNG Fuel Composition*

Hydrocarbons

Methane	85.0% to 90.0% (min.)
Ethane	3.0% to 6.0% (max.)
C_3	1.7% to 5.0% (max.)
C_4 and higher HC	0.2% to 1.0% (max.)

Other Species

Hydrogen	0.1% (max.)
Carbon monoxide	0.1% (max.)
Oxygen	0.5% to 1.0% (max.)

Inert Gases

Sum of CO_2 and N_2	1.5% to 5.0%

* Ranges reported and expressed as mole percent

Potential Relaxation of the CNG Specification Raises Several Concerns

- Impact on air quality
- Customer dissatisfaction and increased engine maintenance, repair and operating costs
- Adverse effects on performance
  - Propensity for engine knock
  - Impact on long-term engine durability
- Greater adverse impact on older engines
- In-use emission test results

EMA POSITION ON CNG SPECIFICATION

- Although some alternative-fueled engines may be robust enough to tolerate a relaxation in fuel quality limits, a relaxation of the standard will adversely affect emissions, durability and engine performance of other engine designs.

- Electronic controls have some capability to adapt to variability, but such capability is limited and cannot compensate for every fuel specification.

- Until more information is made available, EMA cannot support a relaxation of the standard.

Next Steps

- Determine size and location of fleets currently operating on off-specification fuels
- Review customer experience
- Cooperate with ARB in developing a proposal for a revised specification for new technology engines
    - performance-based specification
    - scope