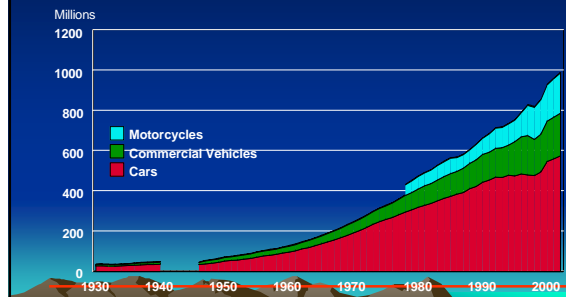


“The Global Experience With Lead in Gasoline And the Lessons We Should Apply to the Use of MMT”



International Workshop
Neurotoxic Metals:
Lead, Mercury and Manganese
From Research to Prevention
Michael P. Walsh
June 17-18, 2006
Brescia, Italy

World Motor Vehicle Population



People Everywhere Are Affected By The Emissions From Vehicles

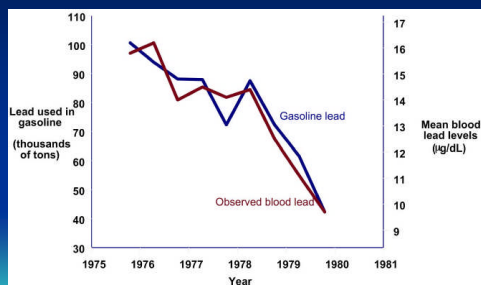


Why Are Fuels Important?

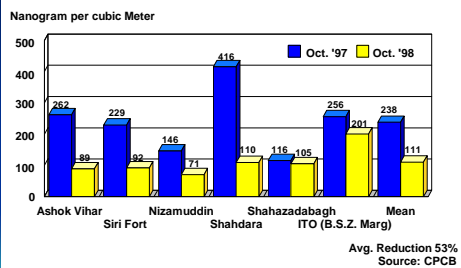
- Fuel Constituents **Directly Affect** Emissions
- Fuel Changes Can **Immediately Impact** on Emissions/Air Quality
- Fuel Composition Can **Enable/Disable** Pollution Control Technology



Linkage Between Lead Used in Gasoline and Mean Blood Lead Levels in the US

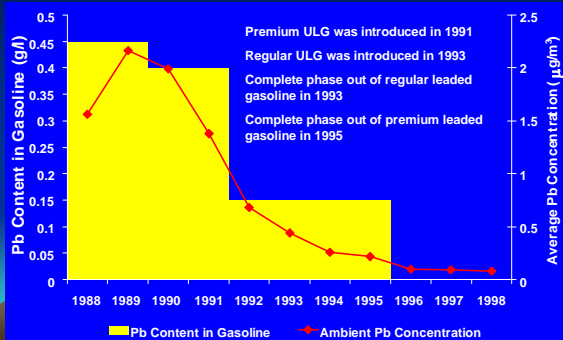


Ambient Particulate Lead in Delhi Pre and Post Unleaded Petrol

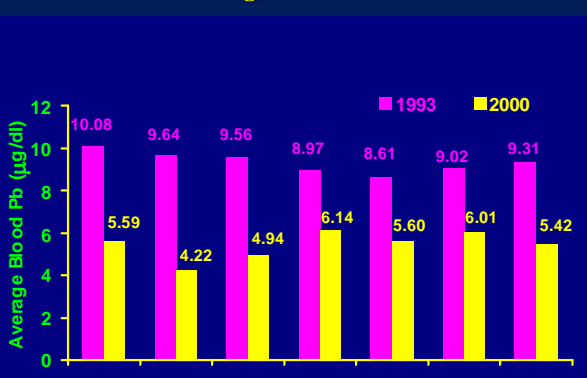


Lead Phase Out Started in September 1998

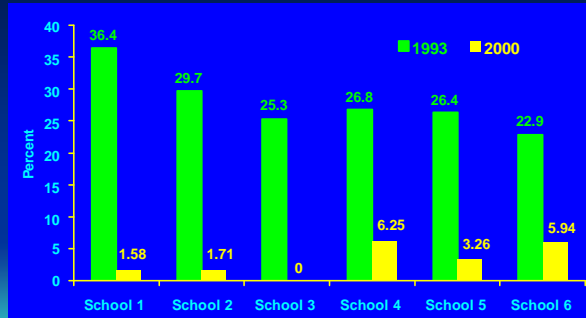
Ambient Pb Concentrations in Bangkok and Pb in Gasoline from 1988 - 1998



Comparison of Average Blood Pb Levels in Children at 6 Schools in Bangkok between 1993 and 2000

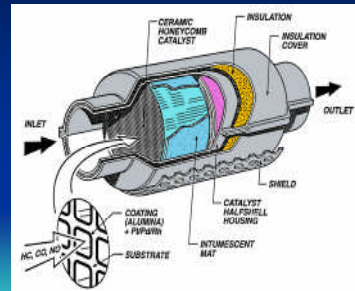


Percentage of School Children with Blood Pb Levels $\geq 10 \mu\text{g/dl}$



Lesson: Reducing Lead in Gasoline, Reduces Lead in Our Children's Bodies

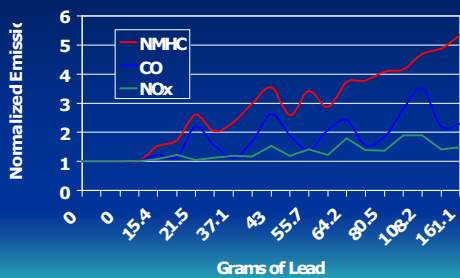
The Three-way Catalytic Converter: A Familiar Technology Re-Engineered for High Performance in Close-coupled and Underfloor Applications



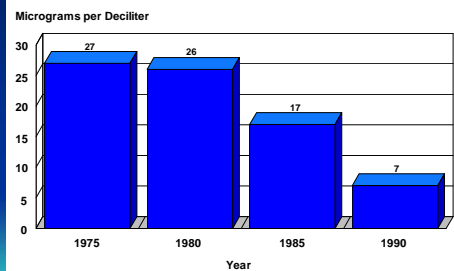
- Layered washcoat architectures and support materials with high thermal stability
- Integrated HC adsorption functions
- Mounting materials with improved durability
- High cell density ceramic or metallic substrates
- Insulation schemes for heat management

Lesson: Lead Free Fuel Facilitates Other Advanced Pollution Controls

Impact of Lead on Catalyst Performance



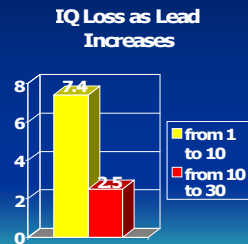
Blood Lead Levels Considered Elevated



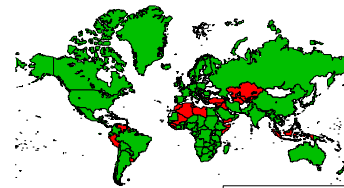
Lesson: The More We Know, The Greater The Concern!

Study Indicates Largest Impact at Very Low Lead Levels

- New England Journal of Medicine (4/17/2003)
- 172 children tested at 6, 12, 18, 24, 36, 48, 60 months
- Corrected for confounding variables
- 101 children never above 10 µg/dl
- Blood lead significantly associated with I/Q



Worldwide Status of Leaded Gasoline Early 2006



■ Lead Free
■ Still Some Leaded

Lesson: Companies Will Continue to Sell The Product Until Banned!

Opinion: The Jakarta Post (Nov 8, 2004) Leaded Gasoline is still Needed

"In 2003, Indonesia's government expressed its intention to ban leaded gasoline in 2005. . . . At a time when the price of crude oil has dramatically escalated it makes sound economic sense to delay lead phase-out – which will be exceedingly costly and consume more energy – until oil supplies and prices stabilize, and ideally fall. Given that producing only unleaded gasoline would be extremely costly, are there paramount environmental arguments in favor of a rapid lead phase-out, regardless of the expense? In my opinion, no. I contend that **there is no medical evidence on the effects of lead on health to oppose the view that the orderly gradual lead phase-out in Indonesia, which is already underway, should continue.**"

"The writer is a UK-based international consultant on fuels, engines and emissions. Until the early 1990s he was first secretary and then chairman of the European Oil Industry's Co-operative Octane Requirement Committee."

The Author, Bob Larbey, failed to note that he worked for Octel, the company that sells lead to Indonesia.

MMT is An Emerging Fuels Problem

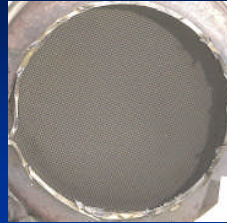
- ❖ Fuel octane under pressure due to elimination of lead
- ❖ Organo-metallic additives are a cheap way to increase octane
- ❖ However, experience to date with these additives shows that they can cause
 - Health problems
 - Problems with Vehicle Pollution Controls

Does This Sound Familiar?

MMT Use Is Limited in OECD Countries But Widespread in Developing Countries

- Health Issues in US (EPA Sued After Ban)
- "Blue Ribbon Panel" in Canada (Canada Sued After Ban)
- Metal Additives Testing Protocol Being Developed in EU
- Banned in CA
- Not Used in Japan, Brazil
- Banned in India
- Widely Used in China
- Used in Indonesia, other Asian Countries
- Widely Used in Africa

Impact of MMT On High Cell Density Catalyst in Canada



California Civic 600
cpsi catalyst - 49,000
miles



Canadian Civic 600
cpsi catalyst - 49,000
miles

Not a Scientific Study But A Cause For Concern

Experience with MMT China: Blocked catalytic converter



Not A Scientific Study But A Cause For Concern

Source: Schindler, VW

Implications of Recent Health Study



"The finding that manganese transport out of the brain occurs via the slow process of diffusion, rather than via carrier-mediated transport, is important: **it suggests that no mechanism exists to protect the brain from accumulating manganese.** This finding has important implications for neurotoxicity resulting from chronic manganese exposure."

This Report Has Been Aggressively Challenged By Afton!

Health Effects Institute Statement (December 2005)

- There is a large body of evidence that
 - under certain circumstances, manganese can accumulate in the brain,
 - chronic exposure can cause irreversible neurotoxic damage over a lifetime of exposure,
 - manganese may cause neurobehavioral effects at relatively low doses, and
 - these effects follow inhalation of manganese-containing particles.

HEI's Comments on the Afton Rebuttal

Recent Findings From UC Irvine

- Mn Inhaled by Pregnant Mice Has Adverse Effects on Development of Brains in the Offspring
 - Neuronal structure significantly altered in brains of pups from Mn-treated dams
 - Increased Susceptibility to Neurotoxins

Source: Professor Mike Kleinman, UC Irvine

ICCT Conclusions Regarding MMT

(ICCT) is unable to conclude that the use of MMT will not result in direct adverse health impacts nor that emissions of CO, HC and NOx from catalyst equipped cars will not increase. In 1996, the Administrator of the EPA stated, "the American public should not be used as a laboratory to test the safety of MMT". The ICCT believes this statement to be true for the citizens of every country. Consistent with the precautionary principle, the ICCT recommends that countries delay any use of MMT in gasoline at this time, pending the outcome of ongoing health-based studies and further review of the vehicle impacts.

Copies of the ICCT Report Available at
<http://www.cleantransportcouncil.org/index.php>