

Asian Vehicle Emission Control Conference 2004
(AVECC 2004)
27 - 29 April, Beijing, China.



Impact of MMT on vehicle emission performance

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Background - MMT Fuel Additive

- ❖ Market fuel octane under pressure due to limits being placed on composition by upcoming fuel legislation
- ❖ Organo-metallic additives are a cheap way to increase octane
- ❖ Experience with these additives shows that they can cause
 - Health problems
 - Technical problems

Previous Findings



HEALTH
EFFECTS
INSTITUTE

“Exposure to some metals has been found to cause neurologic damage — for instance, in workers exposed to moderate to high levels of manganese via inhalation.”

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Transport Mechanisms



HEALTH
EFFECTS
INSTITUTE

“Yokel and Crossgrove have provided convincing evidence that **manganese enters the brain via carrier-mediated transport**, confirming and extending previous observations. They also are the first to have shown that **manganese leaves the brain via diffusion only**, a much slower process than carrier-mediated transport.”

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Implications



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“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.**”

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Technical problems with MMT fuel additive

- ❖ Experience with MMT shows that it can cause
 - ❖ Catalyst blocking
 - ❖ Spark plug misfire
 - ❖ Hego biasing / malfunction
- ❖ Significant risk for in-service emissions compliance (100,000km for Stage 4) if used in Europe
- ❖ Higher cell densities is expected to be more prone to manganese blocking (Tier 2 vehicles using up to 900:2 cell density catalysts)

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European Commission Fuel Review

- ❖ The current fuel directive instructs Commission to further review fuel quality by end of 2005
- ❖ It specifically asks for a review of the effect of metallic fuel additives on aftertreatment systems
- ❖ Current European fuel specification does not specifically exclude Mn or Fe, which leaves the door open for their use
- ❖ MMT is being used in some EU Accession States
- ❖ Most recent survey showed up to 55ppm manganese in Latvia – joins EU in 2004

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Experience with MMT

- ❖ Canada:
 - Customer complaints:
 - Uneffective catalysts by plugging.
- ❖ South Africa:
 - Endurance tests with market fuels:
 - Untypically high emissions deterioration.
 - Spark plug deposits
 - Successful test completion unlikely

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Experience with MMT: Spark plug deposits



12.000 km



30.000 km



55.000 km

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Experience with MMT: HEGO



0 km



12.000 km



39.000 km

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Volkswagen experience concerning MMT

❖ China:

Endurance tests with market fuels

- spark plug fouling
- catalyst plugging
- manganese containing deposits in the exhaust system (including combustion chambers)
- deposits in piston ring grooves
- wear on piston rings and ring grooves
- poisoning of the lambda sensors

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China: Deposits on glow plugs

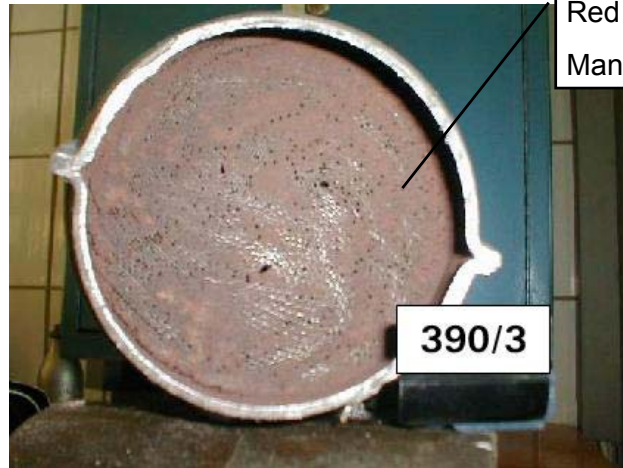


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Experience with MMT

China: Blocked catalytic converter



Red Deposits of
Manganese-Oxide

After
33.000 km

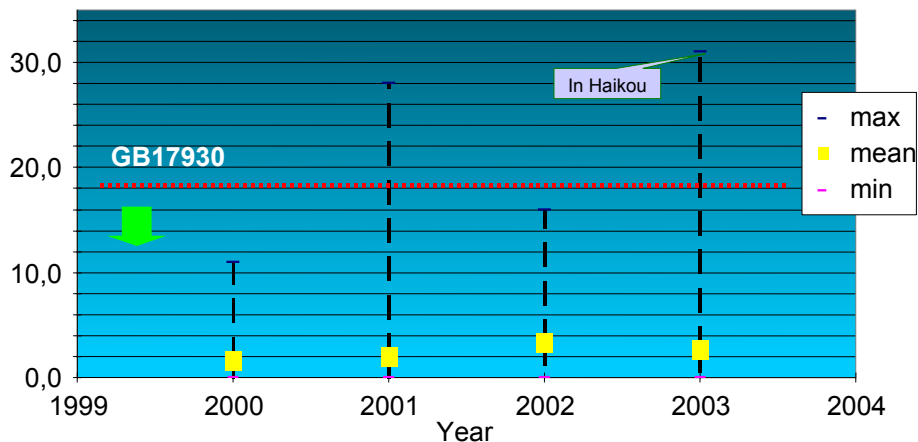
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China: Manganese Content of Gasoline

Manganese Content [ppm]

Source: SVW

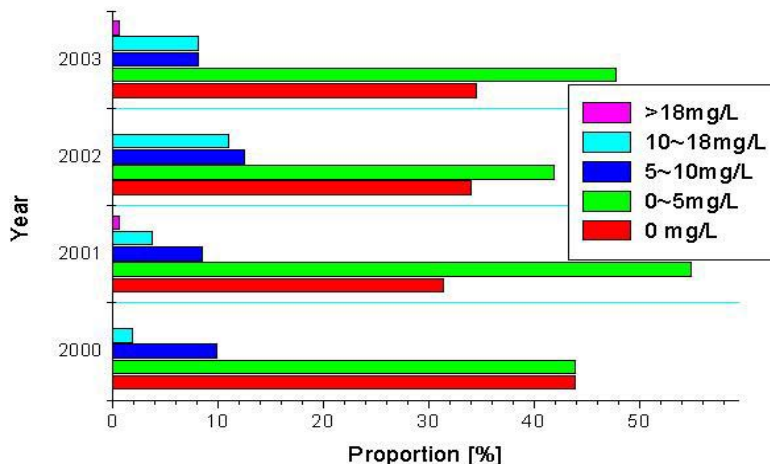


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China: Manganese distribution

Source: SVW



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MMT - Position of Volkswagen

- ❖ No robust engineering solution
- ❖ The adverse effects these fuel additives have on vehicle emissions are in direct contradiction with air quality objectives.
- ❖ The anticipated benefits of the advanced emissions requirements for gasoline vehicles will be compromised by the addition of these fuel additives in commercial fuels.
- ❖ **Banning of these products is essential**

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