Aftermarket Catalytic Converters

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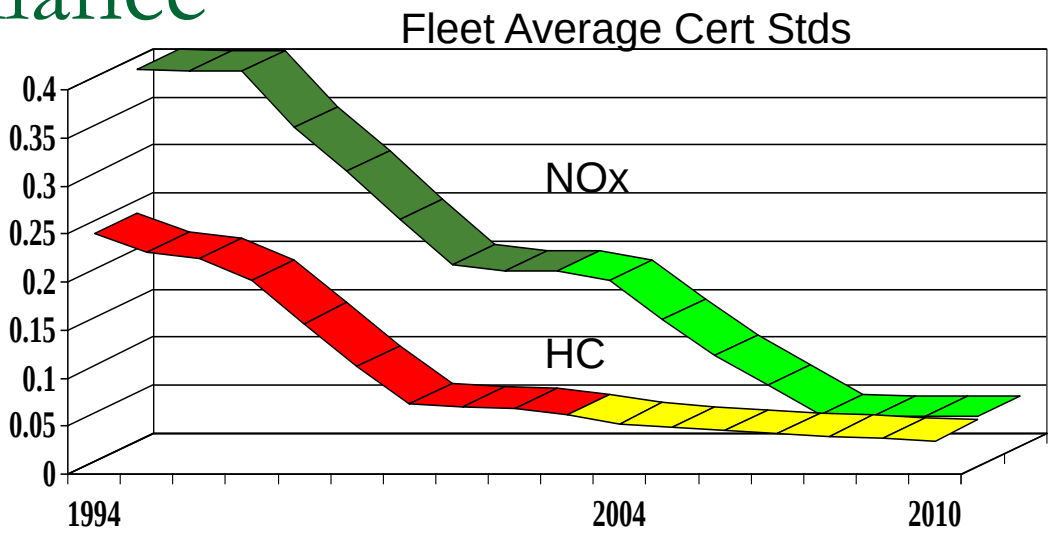
Background

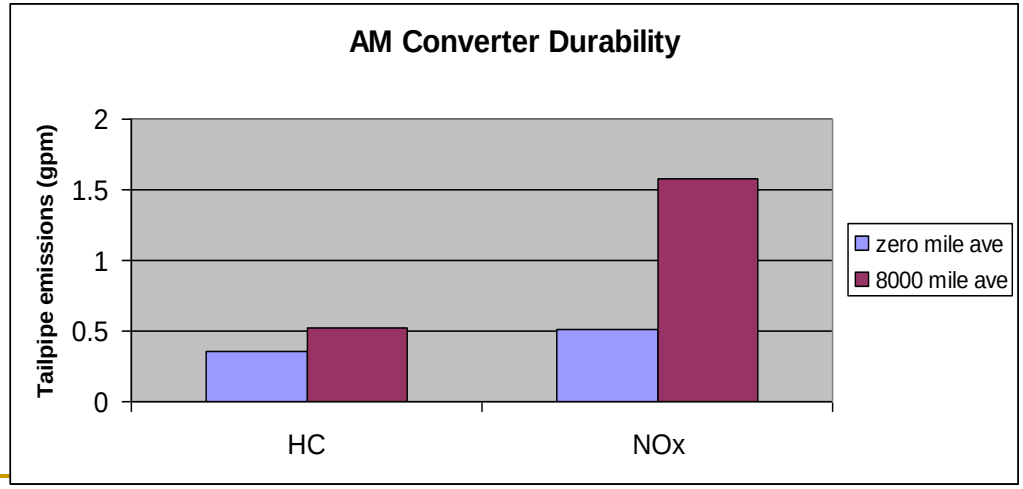
- CA reg and Fed ‘enforcement policy’ provide for use of aftermarket replacement catalytic converters
  - low cost option for older/high mileage vehicles
  - less efficient and less durable than OEM
- Efficiency was based on requirements set in 1980’s
  - 70% for HC, CO
  - 60% NOx (30% Federally)
  - 25K mile durability requirement

Need for Improvements – Emissions compliance

- Vehicles meeting LEV I or better require 90%+ efficiency to achieve standards

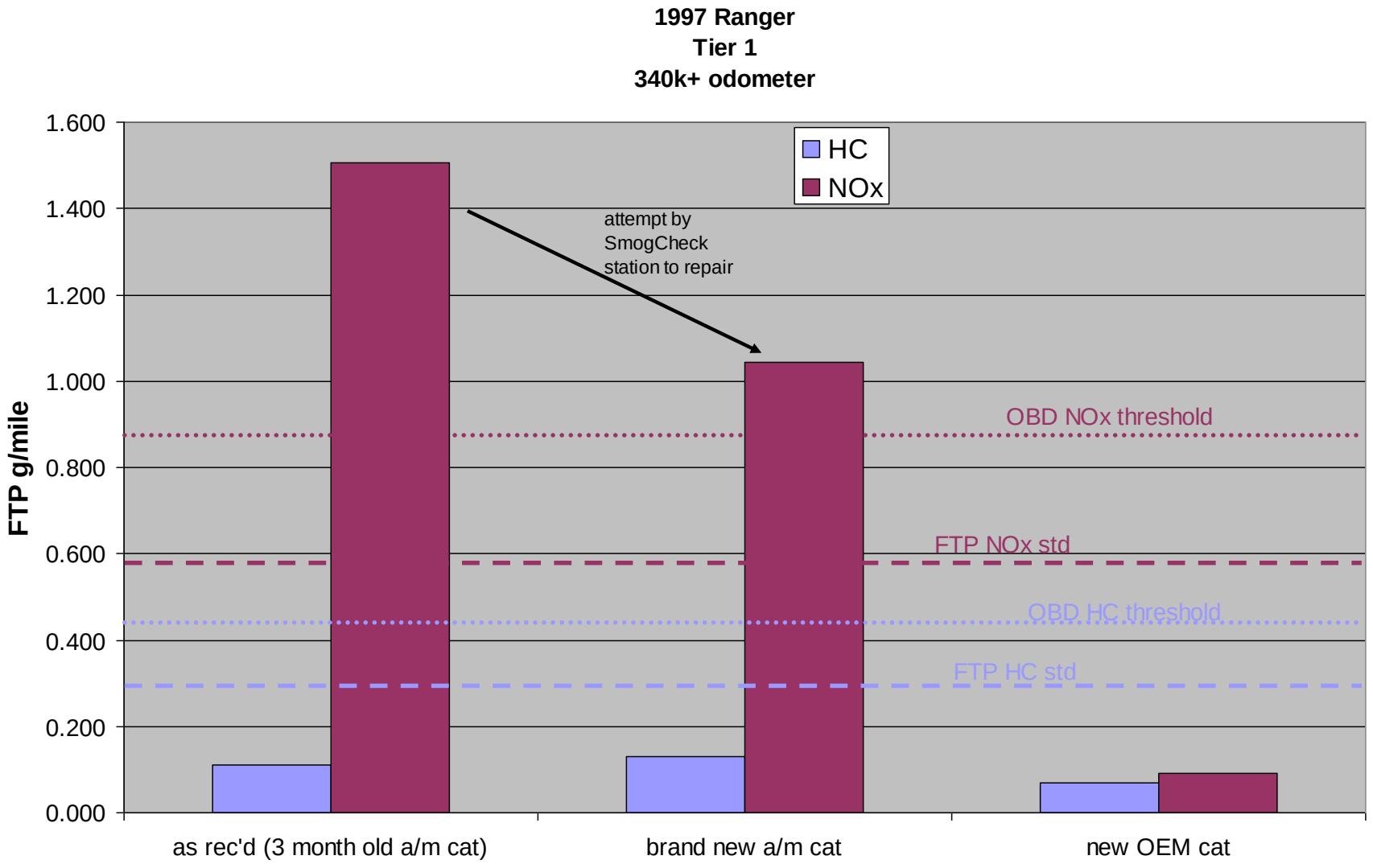


- ARB testing found a/m converter performance fell very quickly over time



Need for Improvement – OBD II Compatibility

- OBD II systems infer catalyst efficiency through correlation with oxygen storage performance
- Proper converter formulation needed to ensure compatibility with OBD II monitoring
- ARB testing of high emitters found poor performing a/m converters on OBD II vehicles with no MIL illumination
  - Such vehicles missed by OBD only I/M


1997 Ranger
Tier 1
340k+ odometer
FTP g/mile
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
HC
NOx
attempt by SmogCheck station to repair
OBD NOx threshold
FTP NOx std
OBD HC threshold
FTP HC std
as rec'd (3 month old a/m cat)
brand new a/m cat
new OEM cat

ARB's A/M Catalyst Rulemaking (2007)

Goals

- Continue policy of providing for lower cost replacement alternatives (compared to OEM catalytic converters)
- Increase performance/durability requirements to ensure that a/m converters keep pace reasonably with newer emission standards and technologies.

ARB's A/M Catalyst Rulemaking (2007)
New Requirements

- Conversion Efficiency – must be high enough for vehicles to meet useful life emission standards
  - No fixed efficiency standard—show it meets FTP standards on the vehicle
- Durability: 5 years/50,000 miles
- OBD II compatibility demonstration for converters designed for 1996 and newer vehicles
- Evaluation procedure improvements
  - Quality control
  - Defined laboratory aging cycle
  - Better converter labeling

Emission Benefits

- ARB Testing: New requirements provide for additional 106 lbs HC+NOX reduction per vehicle over 5 year life on pre-OBD II cars
- OBD II demonstration requirements prevent washcoat formulations that mask poor converter performance

Cost Effectiveness

- Price increase of about $200 per converter
  - $300 ave price versus about $100
  - Prices still 1/2 to 2/3 of OEM parts
- Improved durability mitigates $/mile impact

Cost per 100 Miles of Vehicle Operation

Old Requirements	New Requirements
$0.24 – $0.60	$0.52 to $0.70

- Estimated cost effectiveness: $1.88/lb HC+NOx reduced

Implementation

- January 1, 2009 start date
- Coverage is an important issue for owners
  - Frustration/complaints when low cost option unavailable
  - Widespread pre-OBD II vehicle coverage
  - OBD II a/m converters
    - narrower vehicle applicability for given design
    - Coverage continues to expand
    - A/M cats not currently available for some low volume models

Compliance/Enforcement

- Regulation requires up front approval of product designs
- Quality audit procedures/reporting
- Use of 49 state converters in CA continues to be enforcement issue
  - internet distributors
  - Illegal/improper installations can be caught through visual I/M inspection, but technician diligence/consistency is hard to enforce.

Summary

- 1980's era requirements drastically outdated by emission performance advancements over last 15-20 years
- California's 2007 rulemaking provides for large emission reductions, but preserves availability of relatively low cost converter replacements for older vehicles
- Comparable federal requirements would greatly help to resolve misapplication and enforcement issues.
- More Information:
  http://www.arb.ca.gov/msprog/aftermktcat/aftermktcat.htm