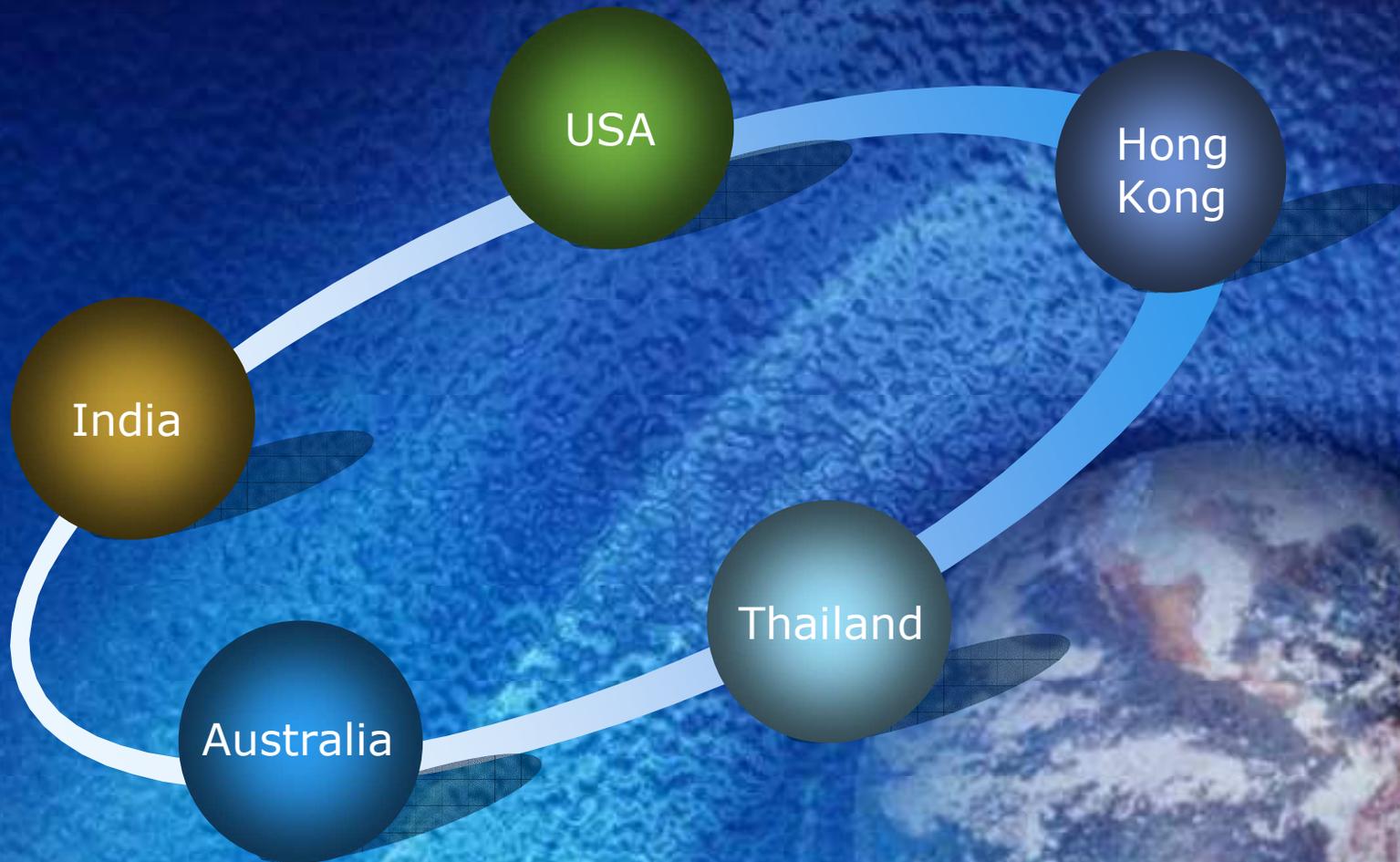
A globe of Earth is shown in the upper left quadrant, set against a background of blue and white textured patterns that resemble water or a sky. The globe shows continents and oceans. The overall background is a gradient of blue and purple.

Worldwide In-Use Diesel Emissions Testing & Research Efforts

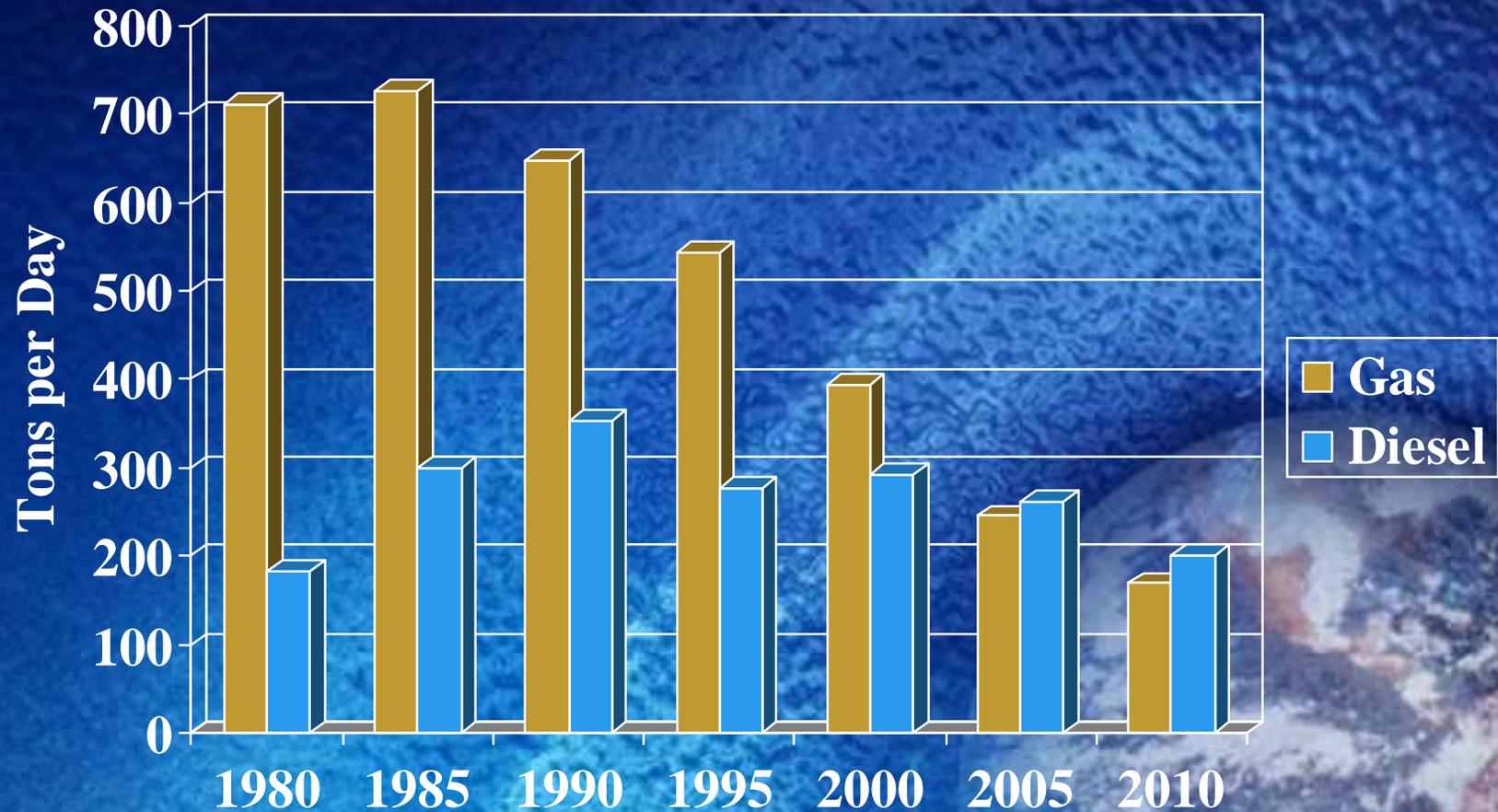
Mark A. Carlock – SMS,LLC

Saint Malo Solutions

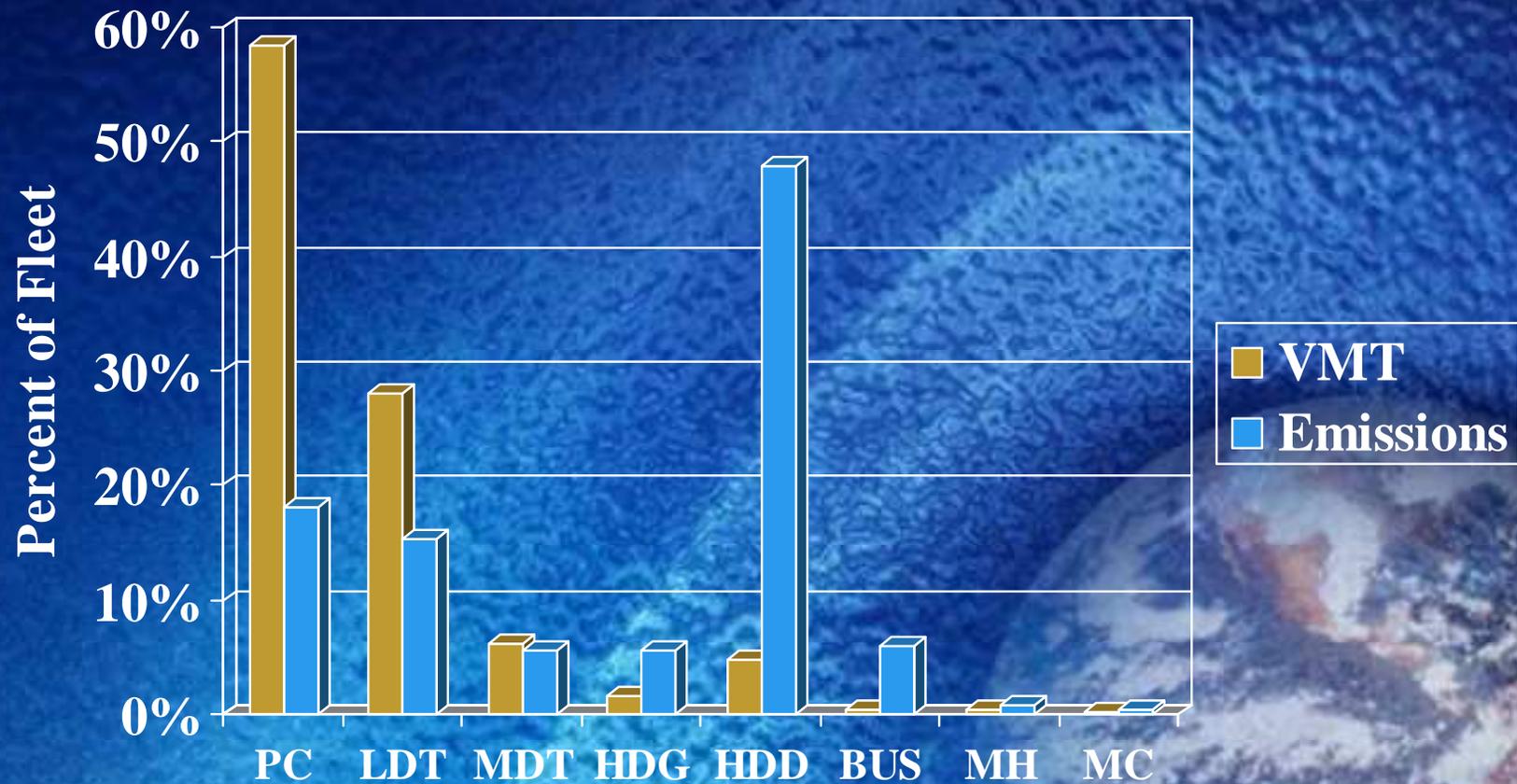
In-Use Diesel Testing



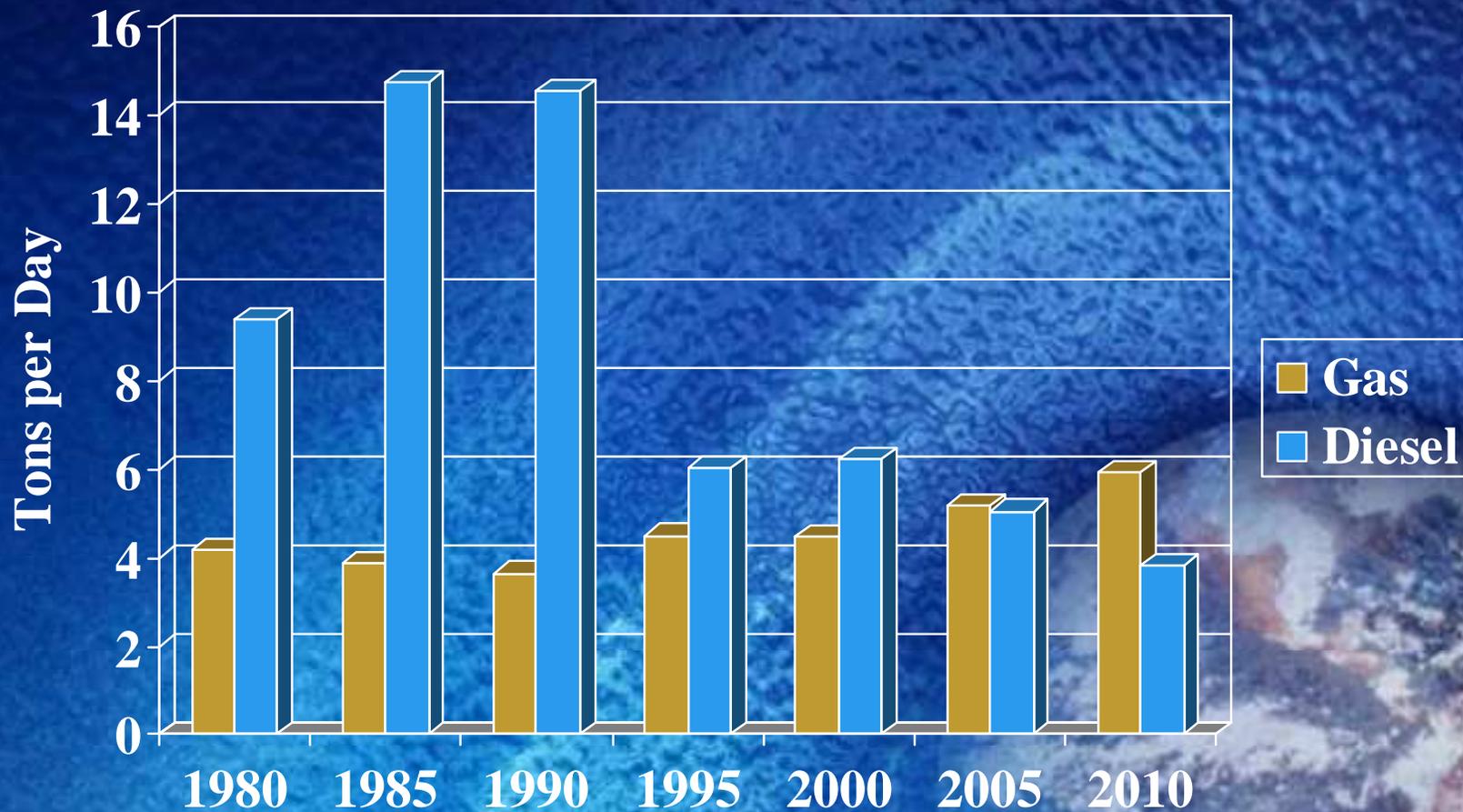
Oxides of Nitrogen Inventory (South Coast Air Basin)



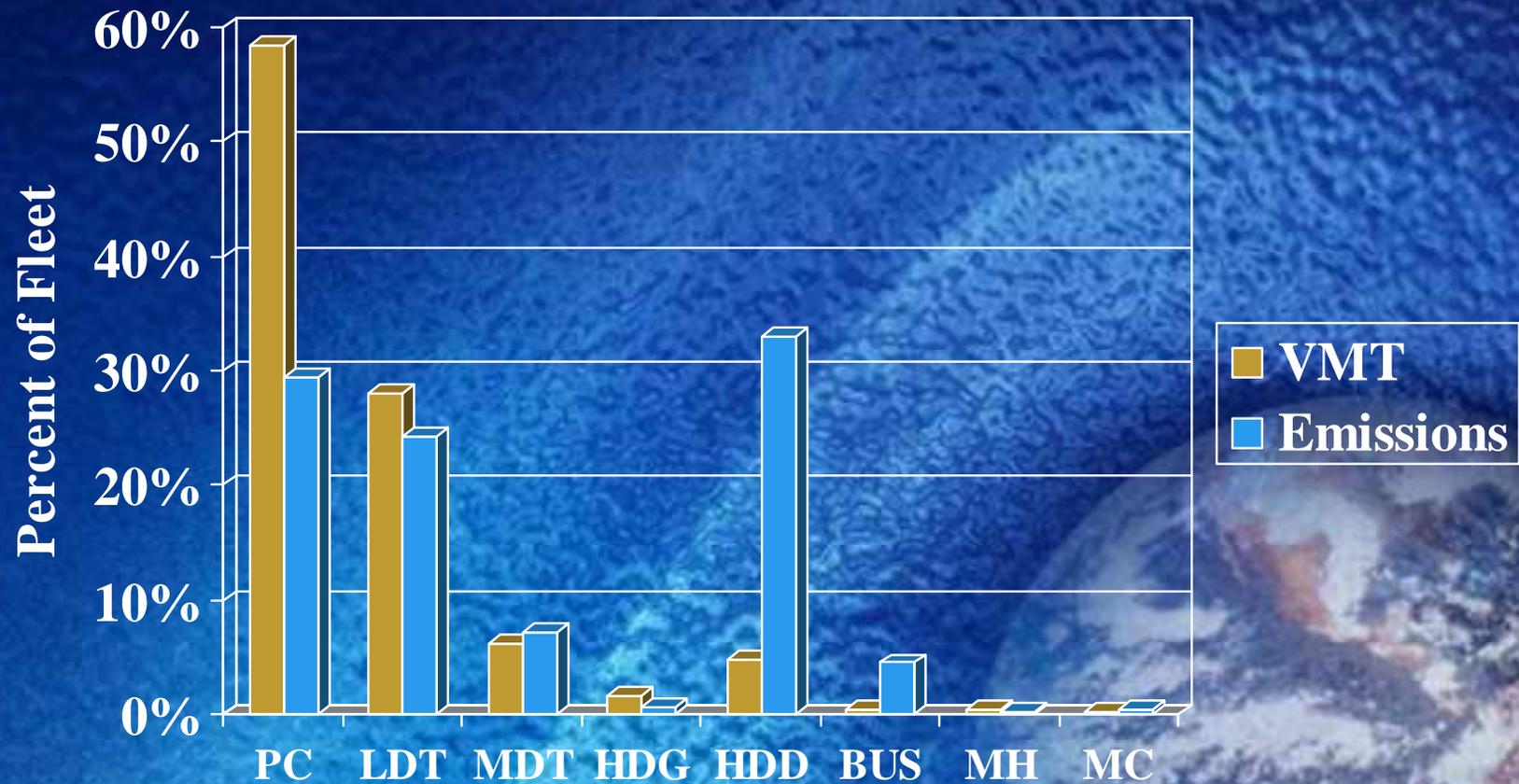
Comparison of Emissions and Activity (NO_x - South Coast Air Basin – 2010)



Particulate Matter Inventory (South Coast Air Basin)



Comparison of Emissions and Activity (PM - South Coast Air Basin – 2010)



Progress Diagram

Phase 1

Phase 2

Phase 3

Phase 4

Laboratory
Testing
Engine
Dynamometer

In-Use
Opacity
Tests

In-Use
Dynamometer
Tests

In-Use
Tests
In-Flight
Analyzers

Australia National Environment Protection Council



	Average NOx	Average HC	Average LLSP	Filter Mass	Average Opacity	Maximum Opacity
AC5080	0.95	0.92	0.70	0.71	0.87	0.80
DT80	0.90	0.85	0.63	0.58	0.68	0.81
2 speed Toruque	0.62	0.72	0.30	-	0.40	0.68
DT80 10s	0.80	0.74	-0.35	-	0.15	-0.21
Lug Down	0.60	0.68	0.22	-	0.26	0.68
2 speed Power	0.55	0.36	0.12	-	0.15	0.17
D550	0.64	0.53	-0.18	-0.23	0.03	-0.23
Snap Idle	0.47	0.23	-0.02	-	0.29	0.59

Laser Light-Scattering Photometry

- This new Australian test's ability to instantaneously evaluate emissions from diesel vehicles has earned it international attention.



“A lot of people have been talking about measuring particulate emissions from in-use [diesel] vehicles, but no one has actually been able to do it [until now],” agrees Don Chernich, manager of the Heavy Duty Diesel section for the California Air Resources Board (CARB)”

Efforts In India

- Implementing smoke opacity tests on chassis dynamometers for all diesel commercial vehicles.
- ARAI developing short test procedures appropriate for regular I/M of all heavy-duty diesel commercial vehicles.
- Developing plans for phasing in PM and NOx measurement in diesel commercial vehicles.
- Establishing a number of chassis dynamometer lanes sufficient to test all heavy-duty commercial vehicles
- Both CNG buses and diesel vehicles would have to undergo loaded mode test in Burari.



Hong Kong EPD

- The Smoky Vehicle Emission Control Program requires smoky vehicles spotted by accredited spotters to undergo a smoke test within a specified period.
- Failure to pass the test results in the vehicle license being cancelled.
- More than 19,000 vehicle license cancellations have been recommended since the implementation of the program in 1988.



Thailand Emissions Testing

- Performing Laboratory Emission Testing to Develop Bangkok Emission Factors
- Experience in Hong Kong and elsewhere is that a loaded test in I & M process is more effective than the free acceleration test currently used in Thailand, based on international experience.





ARB Diesel I/M Concept

- A wide-scale HDD I/M program could utilize existing repair-grade water-brake dynamometers.
- Portable analyzers could be used for emissions measurement. An exhaust flowmeter would be used to compute mass emissions.
- For field screening en-route trucks would be detached from their trailers and operated under a prescribed test cycle (“power curve”).
- Vehicles that exceed established NO_x limits on the I/M test or the field screening test would be required to undergo repairs.

Development of Instrumentation



Sensors' SEMTECH-D Portable Emissions Analyzer



Overall, this analysis demonstrates that the use of portable emissions analyzers in a wide-scale I/M program is feasible.

CARB Mandates On Board Emissions Diagnostics for Heavy-Duty Trucks

- Six Year Phase In
 - Replace Smoke Inspections
 - Cheaper Fleet Inspections
 - Better Repair
-
- Presentation by Tom Cackette to MIT