Developing Integrated Emission Strategies for Existing Land Transport (DIESEL)

Diesel Emission Testing Experience in Bangkok and Test Protocol

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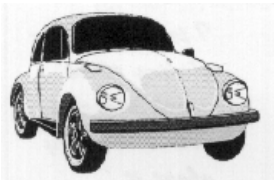
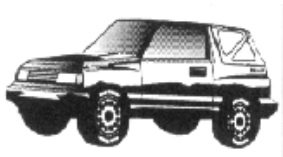
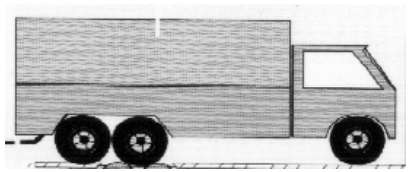
Motorcycle Laboratory



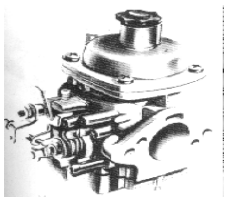
Light Duty Gasoline Vehicle Laboratory



Light Duty Diesel Vehicle Laboratory

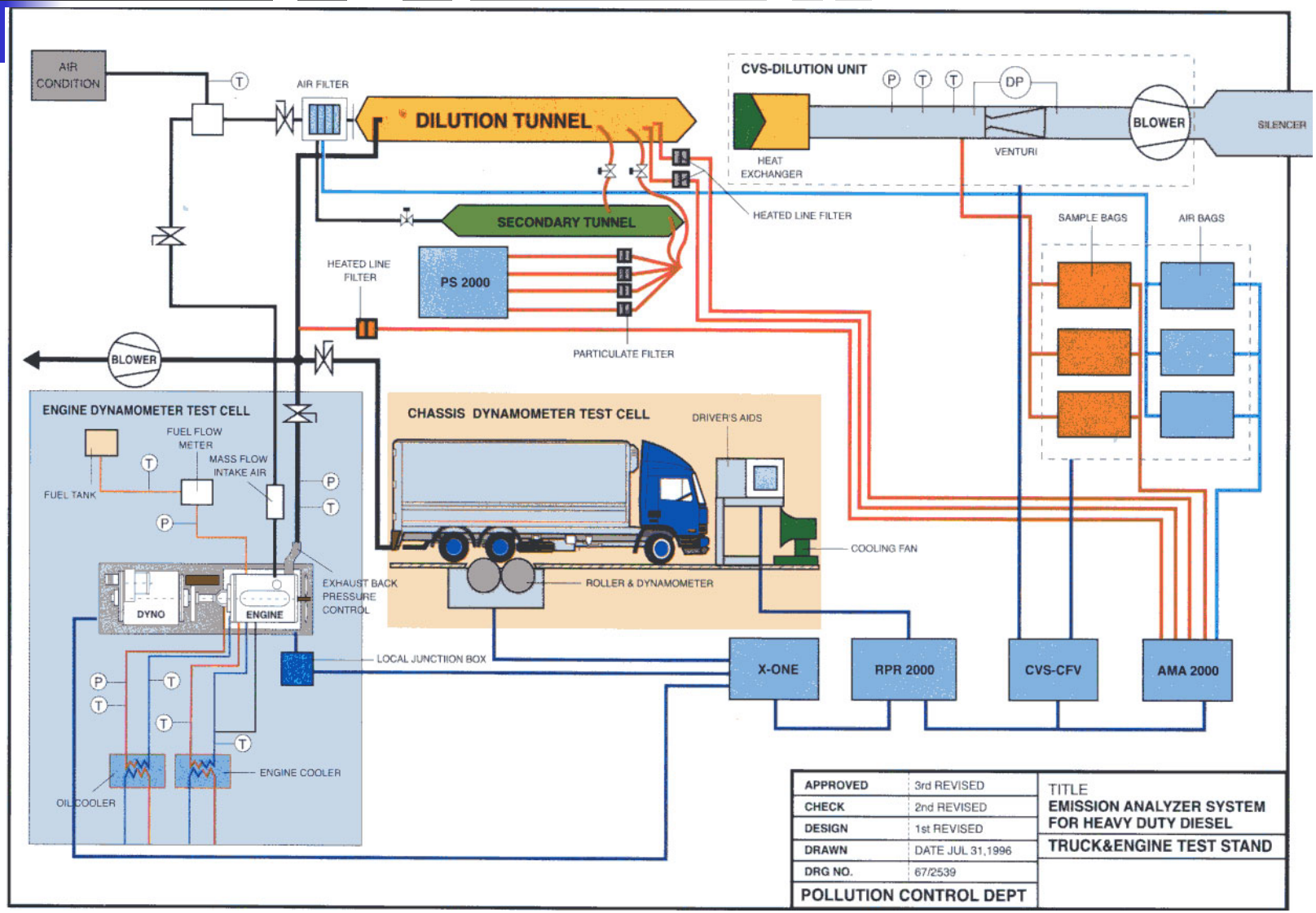


Heavy Duty Diesel Vehicle Laboratory

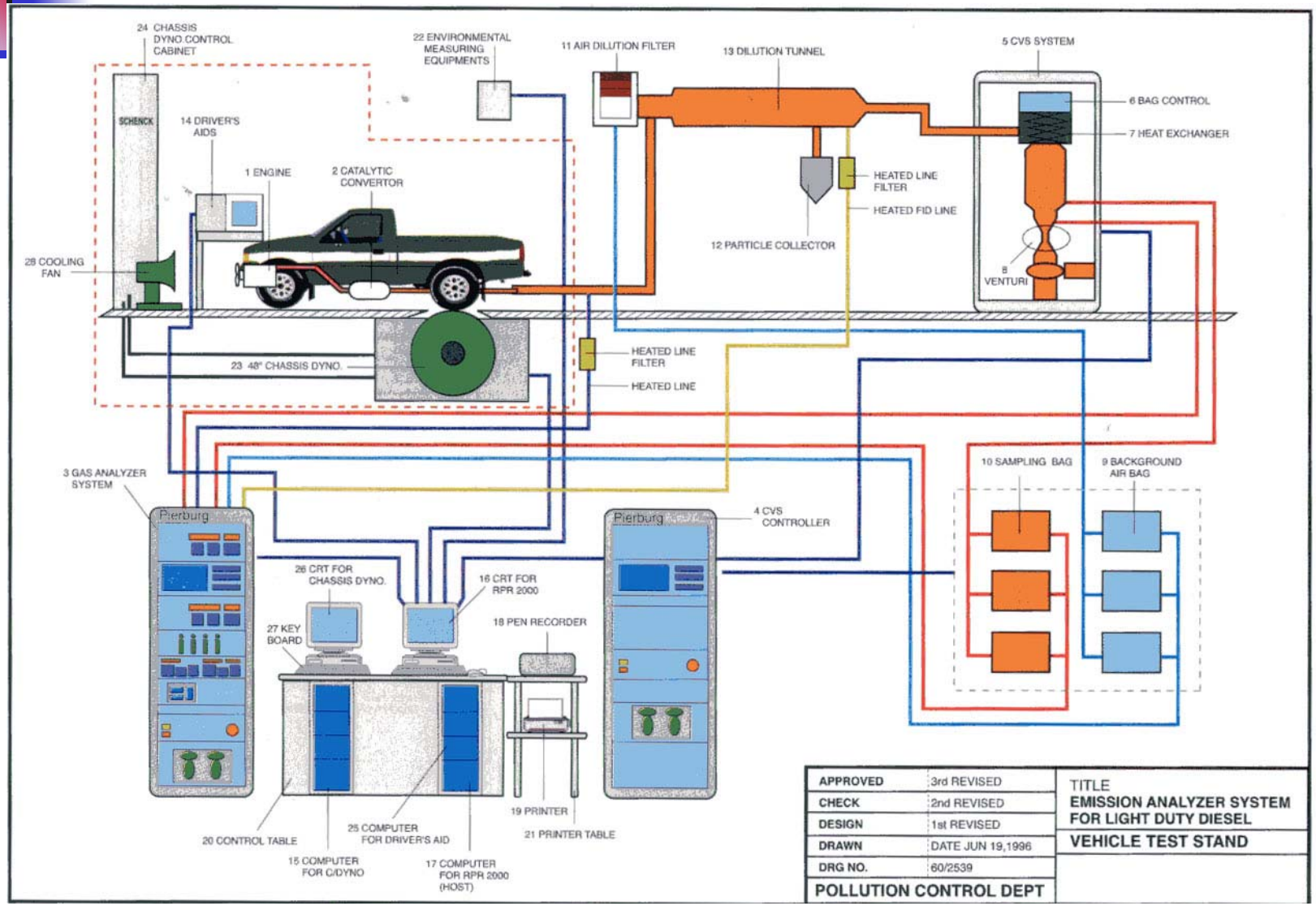


Heavy Duty Diesel Engine Laboratory

Heavy Duty Diesel Laboratory



Light Duty Diesel Laboratory



Japanese Pilot Project in Bangkok

Objectives

- To collect available data on vehicle population characteristics
- To develop emission factors for different vehicle types

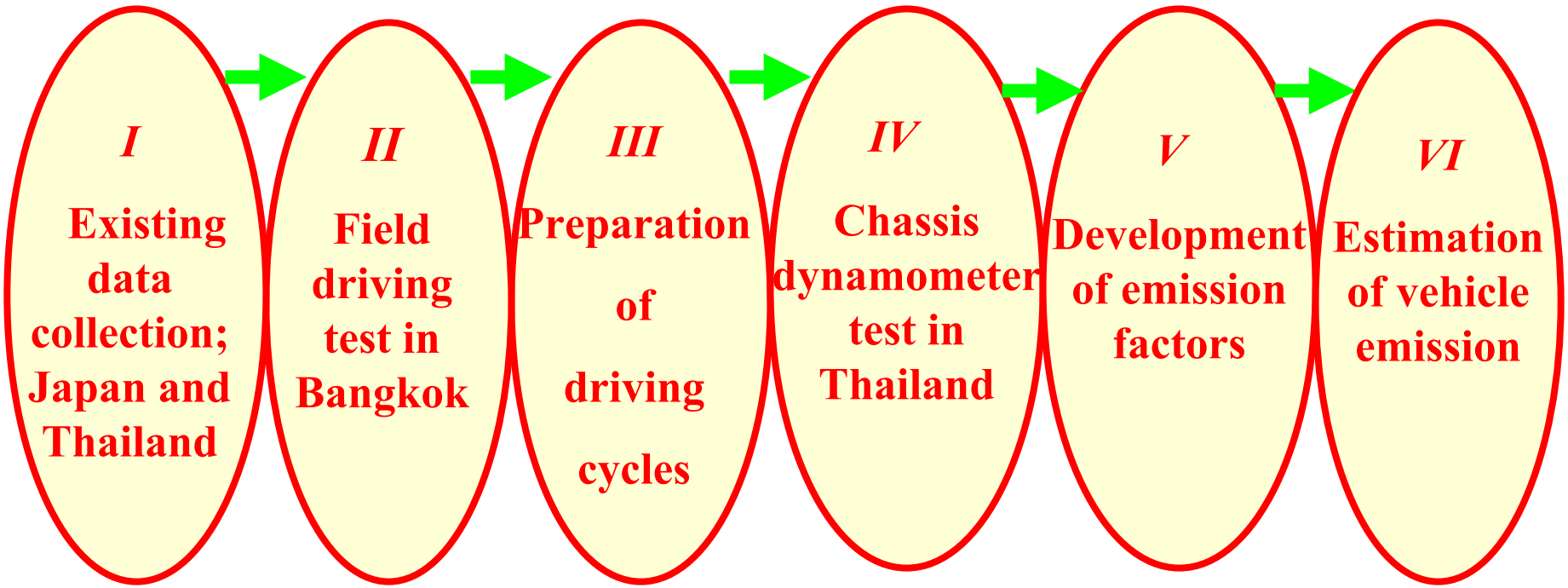
Procedures

1: Design an Emission Factor Test Sample

2: Testing

- Developing a Driving Cycle
- Chassis Dynamometer Testing

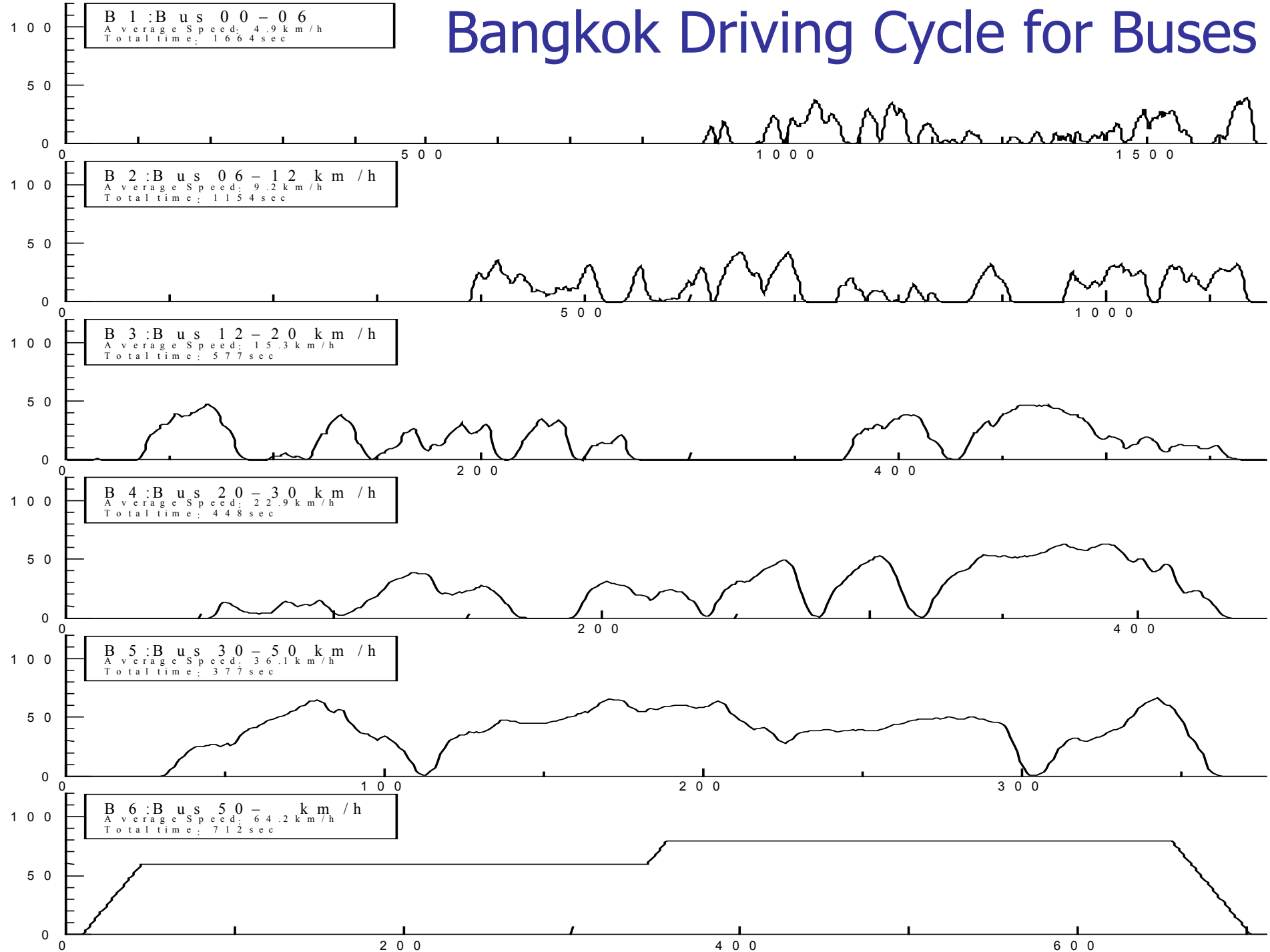
Components


I
Existing data collection; Japan and Thailand
II
Field driving test in Bangkok
III
Preparation of driving cycles
IV
Chassis dynamometer test in Thailand
V
Development of emission factors
VI
Estimation of vehicle emission

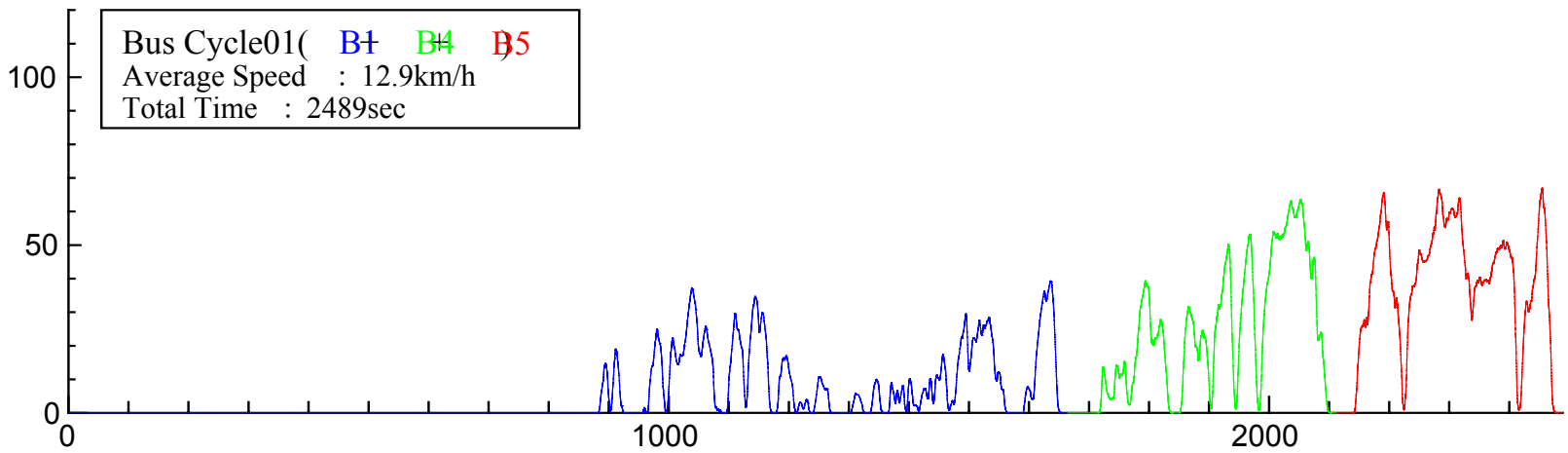
Current Status

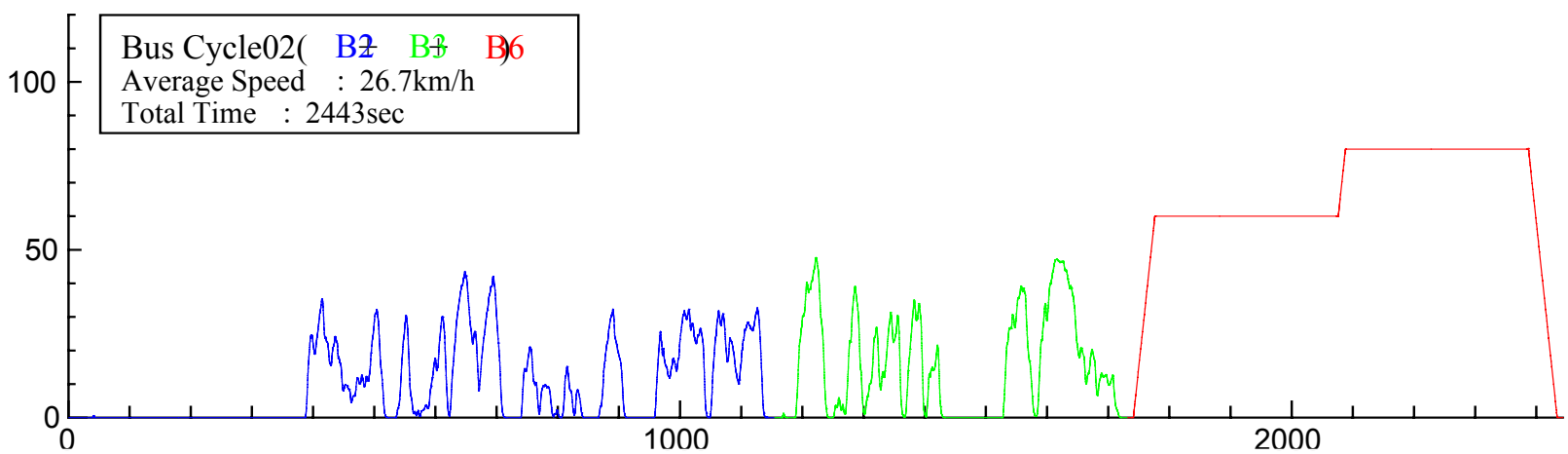
- The Bangkok driving cycle for buses was developed
- The Bangkok driving cycle for light-duty diesel vehicles and gasoline cars are being analyzed
- Chassis dynamometer testing for buses is being conducted

Bangkok Driving Cycle for Buses



Bangkok Driving Cycle for Bus Tests

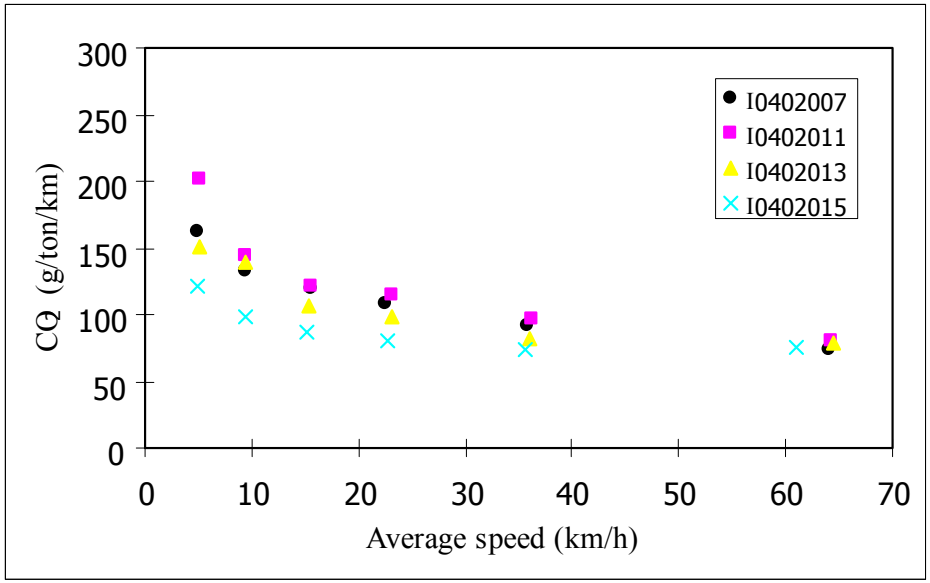


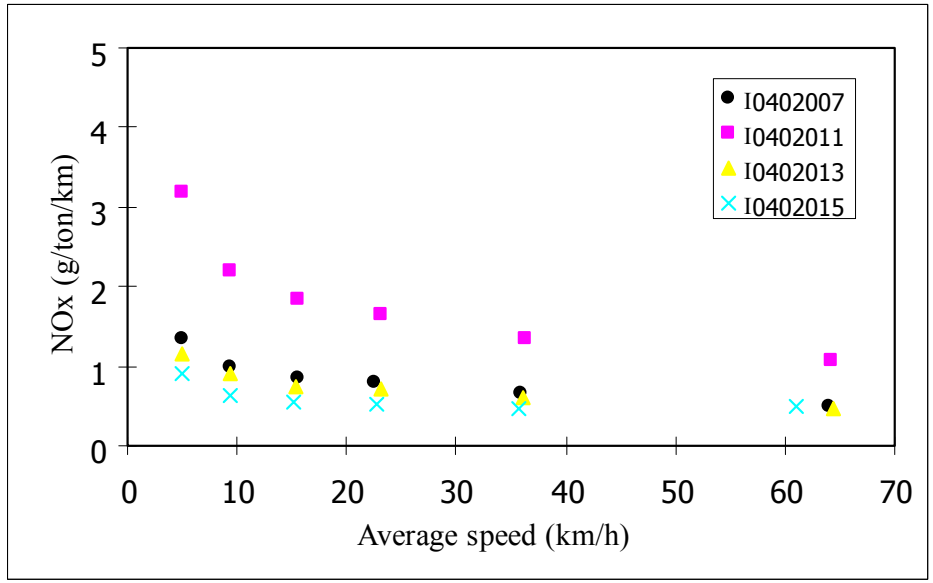


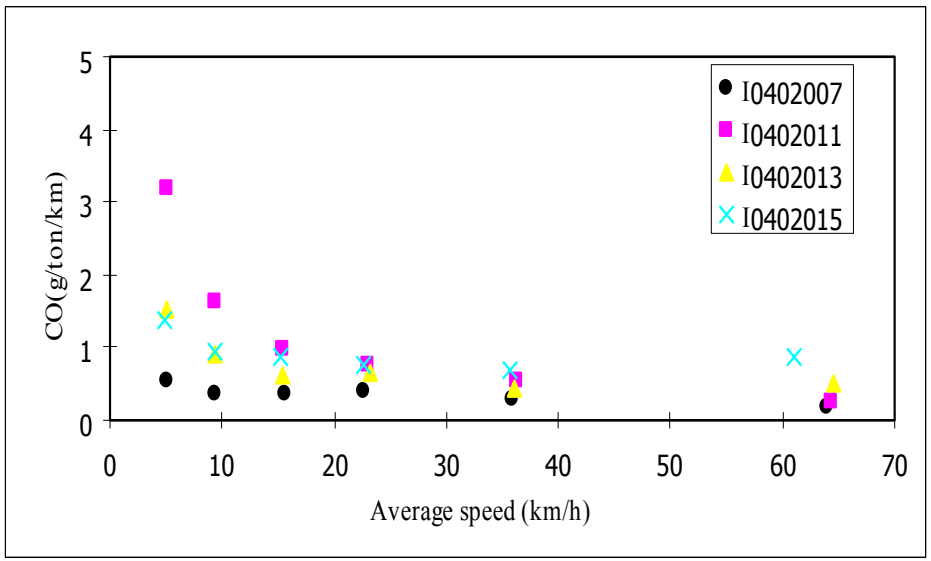
Chassis Dynamometer Schedule

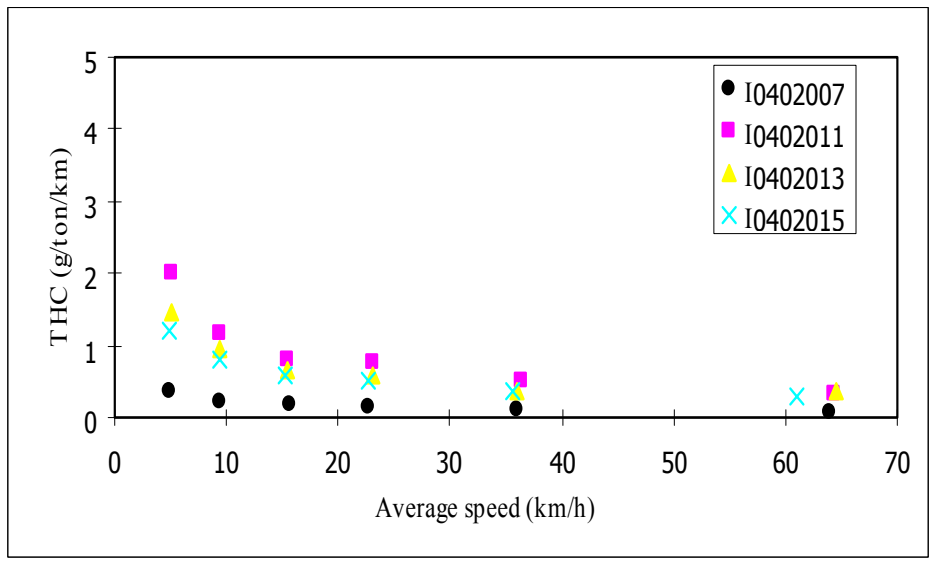
2004			Bus ID number		Bus ID number
		Private Buses			
9 Feb 04	Mon	Bus-1	38 (38-52) Regular		
10 Feb 04	Tue	Bus-2	12 (12-34) Mini Bus		
11 Feb 04	Wed	Bus-3	6 (6-18) Mini Bus	Bus-4	12 (12-14) Mini Bus
12 Feb 04	Thu	Bus-5	20 (20-21) Mini Bus	Bus-6	68 (68-13) Mini Bus
16 Feb 04	Mon	Bus-7	120 (120-4) Regular	Bus-8	25 (34-117) Regular
17 Feb 04	Tue	Bus-9	149(149-48) Regular	Bus-10	28 (28-23) Regular
18 Feb 04	Wed	Bus-11	115 (115-1) Regular	Bus-12	58 (58-17) Regular
19 Feb 04	Thu	Bus-13	143(143-7) Regular	Bus-14	19 (19-18) Regular
23 Feb 04	Mon	Bus-15	14 (14-05) Regular	Bus-16	146(146-12) Regular
24 Feb 04	Tue	Bus-17	92 (37-137) Regular	Bus-18	68 (84-066) Air Cond.
25 Feb 04	Wed	Bus-19	104 (104-5) Air Cond.	Bus-20	157 (157-5) Air Cond.
		BMTA Buses			
26 Feb 04	Thu	Bus-21	(1) Air Cond.	Bus-22	(2) Air Cond.
1 Mar 04	Mon	Bus-23	(3) Air Cond.	Bus-24	(4) Air Cond.
2 Mar 04	Tue	Bus-25	(5) Air Cond.	Bus-26	(6) Air Cond.
3 Mar 04	Wed	Bus-27	(7) Air Cond.	Bus-28	(8) Air Cond.
4 Mar 04	Thu	Bus-29	(9) Air Cond.	Bus-30	(1) Regular
8 Mar 04	Mon	Bus-31	(2) Regular	Bus-32	(3) Regular
9 Mar 04	Tue	Bus-33	(4) Regular	Bus-34	(5) Regular
10 Mar 04	Wed	Bus-35	(6) Regular	Bus-36	(7) Regular
11 Mar 04	Thu	Bus-37	(8) Regular	Bus-38	(9) Regular
15 Mar 04	Mon	Bus-39	44 (93-132) Air Cond.	Bus-40	12 (12-43) Mini Bus
16 Mar 04	Tue	Bus-5	20 (20-21) Mini Bus		
		Heavy Duty Trucks			
19 Mar 04	Fri	Hdtruck1			
22 Mar 04	Mon	Hdtruck2		Hdtruck3	
23 Mar 04	Tue	Hdtruck4		Hdtruck5	

Chassis Dynamometer Test Results









Problems – Test Failed

- The Bangkok Driving Cycle is too complex

- The sample buses used to developed driving cycle were EURO II buses. The tested buses were Mini bus which have less power than EURO II buses.

DIESEL Pilot Test Protocol

- Test Facilities
  - PCD emissions testing Laboratory
- Vehicles Categories to be tested
  - Route Buses (BMTA and Private)
  - Tourist Buses
  - Light Duty Pick ups & Vans
  - Medium Trucks
  - Heavy Trucks

Testing Objectives

- Develop diesel emission baseline for Bangkok
- Generate diesel vehicle emission factors
- Measure the Effectiveness of a Range of Potential Diesel Emission Reduction Strategies

Test Equipment

- Emission Analyzers
  - THC & NMHC: FID
  - NOx: CLD
  - CO & CO2: NDIR
  - CH4: THC-NMHC
  - PM: gravimetric filter & TEOM or LLSP (real time)
  - Smoke opacity: Light extinction
- Exhaust Mass Flow
  - Primary Dilution Tunnel & CVS
- Dynamometer