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REPORT ON
FUEL EFFICIENCY TRIAL

BRAMBLES MANFORD PTY LTD
MUCHEA OPERATIONS

February 13, 1992

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Appendices

Executive Summary

Brambles Manford operate a fleet of nine (9) Volvo Model 122FK and 122 FR prime movers out of their Muchea transport base. Each prime mover hauls a double bottom road train under contract to the Tiwest Joint Venture.

The trucks operate a 238 kilometre round trip from the minesite at Cooljarloo to the treatment plant at Muchea and return.

Each road train hauls a 61 tonne load of mineral sand to the treatment plant and generally returns empty, or with a backload of waste, to the minesite.

Each Volvo prime mover is equipped with a Fleetcom on board computer which records; engine hours, rolling hours, kilometres, percentage idle time, over RPM, over speed, high water temperature, low oil pressure & utilization time.

This fleet was selected by Brambles management as an ideal test bed to prove the economic value of the FTC Combustion Catalyst for the following reasons:

1. a new fleet of well maintained prime movers;
2. accurate data recording because of the hightech monitoring equipment installed on each truck;
3. a constant round trip operation, minimising load and route variables.

The Muchea fleet is managed by an experienced transport executive, Operations Manager, Mr Ian Campbell. Mr Campbell supervised each stage of the trial.

The trial results demonstrated a 6-8% improvement in fuel economy and a 50% reduction in smoke emissions as a result of FTC fuel treatment.

Introduction

An initial one month evaluation of two trucks was conducted during April 1991. The trial resulted in agreement to perform an extended three month fuel efficiency evaluation involving the total fleet during the period September, October and November 1991, which is the subject of this report.

Trial Results

TEST METHOD

Two methods of analysis were involved in this study, namely:

1. STATISTICAL
   Based on analysis of Brambles Muchea fleet operating records and involved extraction of computer print outs of distances travelled, refuelling inputs, loads and backloading data.

   Two periods were covered - a pretreatment (baseline) period from 28 June to 26 August 1991 and a treated period from 29 August to 30 November 1991.

2. CARBON BALANCE METHOD
   An adaption of Australian Standard (AS2077-1982). This method is based on measuring the amount of "burnt fuel" leaving the exhaust as CO_2, CO and HC, under static load conditions.

   Exhaust gas samples are taken via a probe inserted in the exhaust stack and the carbon containing constituents measured by a Horiba infra red gas analyzer. There are several variables relevant to the calculation of mass flow using this procedure. They are

   Barometric pressure
   Ambient temperature
   Exhaust pressure
   Exhaust temperature

   The instruments employed in the test program consist of:

   Exhaust gas constituents HC, CO, CO_2 and O_2 were measured with an Horiba-Mexa 534GE 4 gas infra red analyzer.

   Exhaust and ambient temperature measured with a Fluke Model 51 K/J digital thermometer.

   Exhaust pressure measured with an Air Instruments Model MP Series Precision Micromanometer.

   Ambient pressure determination by use of a Thommen 2000TX altimeter/barometer.

   These values are carefully monitored during each test sequence. The smoke readings are measured by drawing a given mass of exhaust gas through a filter employing a Bosch ETD 020-00 sampling pump. The filters coated with carbon particulates are then measured by means of a Bosch ETD 020-50 Smoke Evaluator and a number assigned, 0.1 being clean and 9.9 dirty.

Results

A summary of the test results are detailed.

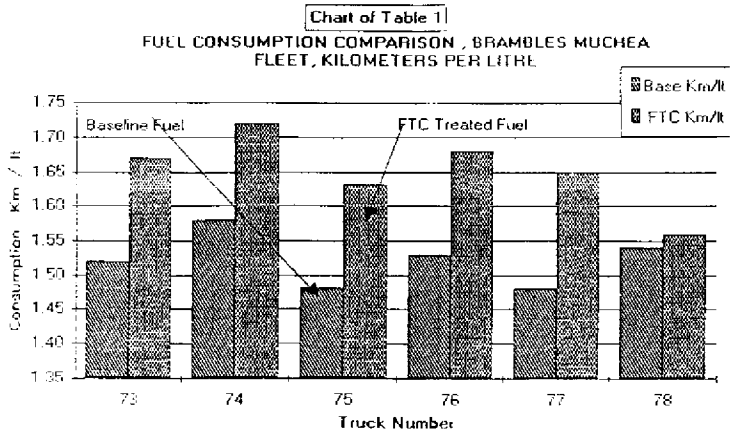
1. *Statistical Method*

The data extracted from Brambles - Muchea fleet operations records are summarized in Table 1. Data for only six (6) of the nine truck fleet was available for analysis.

TABLE 1

Comparison of Muchea Fleet Fuel Economy in km/L Before and After Fuel Treatment

Truck No	Untreated (Base) 28/6 - 26/8/91 Litres	Km	Km/L	Treated 29/8 - 30/11/91 Litres	Km	Km/L	% Improvement
73	34542	52641	1.52	57249	95637	1.67	+ 9.9
74	26182	41625	1.58	40332	69455	1.72	+ 8.9
75	33187	49366	1.48	57147	93307	1.63	+10.1
76	33330	51007	1.53	53895	91060	1.68	+ 9.8
77	20198	30071	1.48	32760	54116	1.65	+11.5
78	34460	53238	1.54	60161	93782	1.56	+ 1.3
Group Av.	*181899*	*277948*	*1.53*	*301544*	*497357*	*1.65*	*+ 7.8*



It should be noted that whilst the load of mineral sand from minesite to treatment plant is a constant, the backloads vary.

During the untreated period waste carried over the two months was 11772.97 tonnes or 5886.49 tonnes waste per month.

During the treated period 36697.77 tonnes of waste were carted during the three months or 12232.59 tonnes waste per month, an increased waste load of 107.8%.

2. *Carbon Balance Method*

The carbon flow and smoke measurement results are summarized in Tables 2A, 2B and 3.

TABLE 2A

Summary of Carbon Balance Efficiency Measurements with Maxi Off

Truck No	Untreated Base 29/8/91 *Carbon Flow gm/sec*	Treated 4/11/91 *Carbon Flow gm/sec*	Variation %
73	1.412	1.318	- 6.7
75	1.393	1.322	- 5.1
76	1.453	1.363	- 6.2
78	1.557	1.468	- 5.7
79	1.396	1.303	- 6.6
81	1.562	1.486	- 4.9
Group Average	*8.773*	*8.260*	*- 5.8*

TABLE 2B

Summary of Carbon Balance Efficiency Measurements with Maxi On

Truck No	Untreated Base 29/8/91 *Carbon Flow gm/sec*	Treated 4/11/91 *Carbon Flow gm/sec*	Variation %
73	1.805	1.730	- 4.1
75	1.786	1.659	- 7.1
76	2.150	2.015	- 6.3
78	2.038	1.894	- 7.0
79	2.128	1.934	- 9.1
81	1.945	1.850	- 4.9
Group Average	*11.852*	*11.082*	*- 6.5*

Bosch Smoke Measurements

Truck No	MAXI OFF Untreated	MAXI OFF Treated	Variation %	MAXI ON Untreated	MAXI ON Treated	Variation %
73	0.1	0.1	0	0.1	0.1	0
75	0.0	0.0	0	0.1	0.0	-100
76	0.0	0.0	0	0.2	0.0	-100
78	0.1	0.1	0	0.1	N/A	N/A
79	0.1	0.0	-100	0.0	0.1	+100
81	0.0	0.0	0	0.2	0.1	- 50
Average	*0.05*	*0.03*	*-40*	*0.1*	*0.05*	*- 50*

Conclusions

This second longer term larger fleet sample FTC catalyst evaluation has confirmed an improvement in truck fleet operating fuel efficiency by all methods of evaluation employed, in the range 5.8% to 7.8%.

Review of Brambles operating data for six units of the fleet confirmed a 7.8% improvement in fuel efficiency.

The carbon balance measurements indicate an average 5.8% to 6.5% reduction in carbon flow rate for six units of the fleet. The results achieved at Muchea employing this test method parallels results we have achieved in a broad range of mining and trucking evaluations we have conducted in Australia.

The Bosch Smoke Measurements whilst indicating a very clean burn in the unloaded condition still provided proof of a 40% to 50% cleaner burn when running on catalyst treated fuel.

Further proof of the efficacy of the FTC catalyst are the results of a recently conducted evaluation in the USA employing the test procedure approved by The Maintenance Council (TMC) for the American Trucking Association (ATA). This test procedure known as the TMC/SAE J1321 involves a fleet of heavy duty diesel trucks. One fleet functions as the control, another runs with a fuel saving device (fuel treatment chemicals, aerofoils etc.). The procedure involves the running of the trucks over a prescribed circular road test circuit, with repeated weighing and filling of detachable fuel tanks after each run over the 45 mile route. The FTC-1 treated fleet recorded a 4.1% reduction in fuel consumption and a 50% reduction in smoke emissions.

The recently completed fleet evaluation at Muchea provides results of similar quality and performance. The data is well controlled and monitored and provides significant economic benefit to Brambles. Catalyst treatment should be maintained ongoing.

Carbon Balance

Computer Print Outs

FUEL TECHNOLOGY PTY LTD — CARBON BALANCE RESULTS

COMPANY : BRAMBLES — LOCATION : MUCHEA

EQUIPMENT : VOLVO F12 ROAD TRAIN — UNIT NR. : P073
ENG. TYPE : VOLVO — MODEL : 122f
RATING : — FUEL :

BASELINE - NO LOAD — DATE : 29/8/91

KILOMETRES : 408270 — TEST MODE: 1650 RPM MAXI OFF
AMB. TEMP (C) : 16.1 — STACK(mm): 115
BAROMETRIC(mb): 1018 — FUEL DENS:

	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	AVERAGE	% ST.DEV
PRES DIFF (Pa):	274	274	274	275	274	274	0.16
EXHST TEMP (C):	142.7	142.8	142.8	142.9	142.9	143	0.06
HC (ppm) :	10	10	10	10	10	10.0	0.00
CO (%) :	0.03	0.03	0.03	0.03	0.03	0.030	0.00
CO2 (%) :	1.84	1.84	1.83	1.83	1.83	1.83	0.30
O2 (%) :	19.75	19.75	19.75	19.75	19.75	19.75	0.00
CARB FLOW(g/s):	1.416	1.416	1.408	1.411	1.408	1.412	0.28

REYNOLDS NR. : 7.34E+04

TREATED - NO LOAD — DATE : 14.11.91

KILOMETRES : 489794 — TEST MODE: 1650 RPM MAXI OFF
AMB. TEMP (C) : 15.5 — STACK(mm): 115
BAROMETRIC(mb): 1010 — FUEL DENS:

	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	AVERAGE	% ST.DEV
PRES DIFF (Pa):	271	272	272	271	269	271	0.45
EXHST TEMP (C):	139.4	139.7	139.9	140.1	140.3	140	0.25
HC (ppm) :	10	10	10	10	10	10.0	0.00
CO (%) :	0.03	0.03	0.03	0.03	0.03	0.030	0.00
CO2 (%) :	1.72	1.73	1.72	1.72	1.71	1.72	0.41
O2 (%) :	19.80	19.80	19.80	19.80	19.80	19.80	0.00
CARB FLOW(g/s):	1.318	1.328	1.320	1.317	1.305	1.318	0.64

REYNOLDS NR. : 7.29E+04 — TOTAL KILOMETRES ON TREATED FUEL 81524

PERCENTAGE CHANGE IN FUEL CONSUMPTION ((TREATED-BASE)/BASE*100) : -6.7 %

REMARKS:

FUEL TECHNOLOGY PTY LTD — CARBON BALANCE RESULTS

COMPANY : BRAMBLES — LOCATION : MUCHEA

EQUIPMENT : VOLVO F12 ROAD TRAIN — UNIT NR. : P073
ENG. TYPE : VOLVO — MODEL :
RATING : — FUEL :

BASELINE - LOADED — DATE : 29/8/91

KILOMETRES : 408270 — TEST MODE: 1650 RPM MAXI ON
AMB. TEMP (C) : 16.1 — STACK(mm): 115
BAROMETRIC(mb): 1018 — FUEL DENS:

	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	AVERAGE	% ST.DEV
PRES DIFF (Pa):	242	243	244	245	246	244	0.65
EXHST TEMP (C):	181.5	181.6	181.9	182.2	183.8	182	0.51
HC (ppm) :	10	10	10	10	10	10.0	0.00
CO (%) :	0.04	0.04	0.04	0.04	0.04	0.040	0.00
CO2 (%) :	2.60	2.61	2.61	2.61	2.60	2.61	0.21
O2 (%) :	19.07	19.07	19.05	19.06	19.06	19.06	0.04
CARB FLOW(g/s):	1.795	1.805	1.808	1.811	1.805	1.805	0.34

REYNOLDS NR. : 6.61E+04

TREATED - LOADED — DATE : 14.11.91

KILOMETRES : 489794 — TEST MODE: 1600 RPM MAXI ON
AMB. TEMP (C) : 15.5 — STACK(mm): 115
BAROMETRIC(mb): 1010 — FUEL DENS:

	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	AVERAGE	% ST.DEV
PRES DIFF (Pa):	239	240	239	239	239	239	0.19
EXHST TEMP (C):	192.3	194	194.2	194.4	194.6	194	0.48
HC (ppm) :	10	10	10	10	10	10.0	0.00
CO (%) :	0.04	0.04	0.04	0.04	0.04	0.040	0.00
CO2 (%) :	2.58	2.56	2.56	2.56	2.56	2.56	0.35
O2 (%) :	18.78	18.78	18.78	18.78	18.78	18.78	0.00
CARB FLOW(g/s):	1.743	1.730	1.726	1.726	1.726	1.730	0.43

REYNOLDS NR. : 6.44E+04 — TOTAL KILOMETRES ON TREATED FUEL 81524

PERCENTAGE CHANGE IN FUEL CONSUMPTION ({TREATED-BASE}/BASE*100) : -4.1 %

REMARKS:

FUEL TECHNOLOGY PTY LTD — CARBON BALANCE RESULTS

COMPANY : BRAMBLES — LOCATION : MUCHEA

EQUIPMENT : VOLVO F12 ROAD TRAIN — UNIT NR. : P075
ENG. TYPE : VOLVO — MODEL :
RATING : — FUEL :

BASELINE - NO LOAD — DATE : 29/8/91

KILOMETRES : 399456 — TEST MODE: 1700 RPM MAXI OFF
AMB. TEMP (C) : 16.5 — STACK(mm): 115
BAROMETRIC(mb): 1018 — FUEL DENS:

	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	AVERAGE	% ST.DEV
PRES DIFF (Pa):	252	253	251	252	251	252	0.33
EXHST TEMP (C):	150.2	150.4	150.5	150.7	150.8	151	0.16
HC (ppm) :	10	10	10	10	10	10.0	0.00
CO (%) :	0.03	0.03	0.03	0.03	0.03	0.030	0.00
CO2 (%) :	1.91	1.91	1.91	1.91	1.90	1.91	0.23
O2 (%) :	19.91	19.89	19.89	19.87	19.87	19.89	0.08
CARB FLOW(g/s):	1.396	1.398	1.393	1.395	1.385	1.393	0.37

REYNOLDS NR. : 6.97E+04

TREATED - NO LOAD — DATE : 14.11.91

KILOMETRES : 478961 — TEST MODE: 1700 RPM MAXI OFF
AMB. TEMP (C) : 17.3 — STACK(mm): 115
BAROMETRIC(mb): 1010 — FUEL DENS:

	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	AVERAGE	% ST.DEV
PRES DIFF (Pa):	245	245	246	245	245	245	0.18
EXHST TEMP (C):	150.1	150.3	151.3	151.6	151.6	151	0.48
HC (ppm) :	10	10	10	10	10	10.0	0.00
CO (%) :	0.03	0.03	0.03	0.03	0.03	0.030	0.00
CO2 (%) :	1.85	1.84	1.84	1.85	1.82	1.84	0.67
O2 (%) :	19.06	19.06	19.05	19.05	19.04	19.05	0.04
CARB FLOW(g/s):	1.330	1.322	1.323	1.327	1.306	1.322	0.69

REYNOLDS NR. : 6.84E+04 — TOTAL KILOMETRES ON TREATED FUEL 79505

PERCENTAGE CHANGE IN FUEL CONSUMPTION ((TREATED-BASE)/BASE*100) : -5.1 %

REMARKS:

FUEL TECHNOLOGY PTY LTD — CARBON BALANCE RESULTS

COMPANY : BRAMBLES — LOCATION : MUCHEA

EQUIPMENT : VOLVO F12 ROAD TRAIN — UNIT NR. : P075
ENG. TYPE : VOLVO — MODEL :
RATING : — FUEL :

BASELINE - LOADED — DATE : 29/8/91

KILOMETRES : 399456 — TEST MODE: 1700 RPM MAXI ON
AMB. TEMP (C) : 16.5 — STACK(mm): 115
BAROMETRIC(mb): 1018 — FUEL DENS:

	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	AVERAGE	% ST.DEV
PRES DIFF (Pa):	225	225	224	225	225	225	0.20
EXHST TEMP (C):	215	215	216	216	216	216	0.25
HC (ppm) :	10	10	10	10	10	10.0	0.00
CO (%) :	0.03	0.03	0.03	0.03	0.03	0.030	0.00
CO2 (%) :	2.80	2.79	2.80	2.80	2.79	2.80	0.20
O2 (%) :	19.03	19.03	19.01	19.00	19.00	19.01	0.08
CARB FLOW(g/s):	1.790	1.784	1.784	1.788	1.782	1.786	0.19

REYNOLDS NR. : 6.13E+04

TREATED - LOADED — DATE : 14.11.91

KILOMETRES : 478961 — TEST MODE: 1700 RPM MAXI ON
AMB. TEMP (C) : 17.3 — STACK(mm): 115
BAROMETRIC(mb): 1010 — FUEL DENS:

	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	AVERAGE	% ST.DEV
PRES DIFF (Pa):	210	210	211	211	211	211	0.26
EXHST TEMP (C):	210.1	210.6	210.9	211.2	211.5	211	0.26
HC (ppm) :	10	10	10	10	10	10.0	0.00
CO (%) :	0.03	0.03	0.03	0.03	0.03	0.030	0.00
CO2 (%) :	2.68	2.68	2.68	2.68	2.68	2.68	0.00
O2 (%) :	19.10	19.10	19.10	19.20	19.20	19.14	0.29
CARB FLOW(g/s):	1.658	1.657	1.661	1.660	1.659	1.659	0.09

REYNOLDS NR. : 5.94E+04 — TOTAL KILOMETRES ON TREATED FUEL 79505

PERCENTAGE CHANGE IN FUEL CONSUMPTION ((TREATED-BASE)/BASE*100) : -7.1 %

REMARKS:

FUEL TECHNOLOGY PTY LTD — CARBON BALANCE RESULTS

COMPANY : BRAMBLES — LOCATION : MUCHEA

EQUIPMENT : VOLVO F12 ROAD TRAIN — UNIT NR. : PO76
ENG. TYPE : VOLVO — MODEL :
RATING : — FUEL :

BASELINE - NO LOAD — DATE : 29/8/91

KILOMETRES : 365668 — TEST MODE: 1700 RPM MAXI OFF
AMB. TEMP (C) : 16.6 — STACK(mm): 115
BAROMETRIC(mb): 1018 — FUEL DENS:

	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	AVERAGE	% ST.DEV
PRES DIFF (Pa):	274	274	275	274	274	274	0.16
EXHST TEMP (C):	138.7	138.9	139.3	139.4	139.9	139	0.34
HC (ppm) :	0	0	0	0	0	0.0	#DIV/0!
CO (%) :	0.04	0.04	0.04	0.04	0.04	0.040	0.00
CO2 (%) :	1.87	1.87	1.88	1.88	1.88	1.88	0.29
O2 (%) :	19.87	19.87	19.87	19.88	19.84	19.87	0.08
CARB FLOW(g/s):	1.449	1.448	1.458	1.455	1.454	1.453	0.29

REYNOLDS NR. : 7.37E+04

TREATED - NO LOAD — DATE : 14.11.91

KILOMETRES : 439561 — TEST MODE: 1700 RPM MAXI OFF
AMB. TEMP (C) : 16.5 — STACK(mm): 115
BAROMETRIC(mb): 1010 — FUEL DENS:

	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	AVERAGE	% ST.DEV
PRES DIFF (Pa):	268	269	270	269	268	269	0.31
EXHST TEMP (C):	136.1	136.1	136.2	136.4	136.5	136	0.13
HC (ppm) :	10	10	10	10	10	10.0	0.00
CO (%) :	0.03	0.03	0.03	0.03	0.03	0.030	0.00
CO2 (%) :	1.78	1.78	1.78	1.78	1.78	1.78	0.00
O2 (%) :	19.92	19.92	19.93	19.92	19.93	19.92	0.03
CARB FLOW(g/s):	1.361	1.364	1.366	1.363	1.360	1.363	0.16

REYNOLDS NR. : 7.29E+04 — TOTAL KILOMETRES ON TREATED FUEL 73893

PERCENTAGE CHANGE IN FUEL CONSUMPTION ((TREATED-BASE)/BASE*100) : -6.2 %

REMARKS:

FUEL TECHNOLOGY PTY LTD — CARBON BALANCE RESULTS

COMPANY : BRAMBLES — LOCATION : MUCHEA

EQUIPMENT : VOLVO F12 ROAD TRAIN — UNIT NR. : P076
ENG. TYPE : VOLVO — MODEL :
RATING : — FUEL :

BASELINE - LOADED — DATE : 29/8/91

KILOMETRES : 365668 — TEST MODE: 1700 RPM MAXI ON
AMB. TEMP (C) : 16.6 — STACK(mm): 115
BAROMETRIC(mb): 1018 — FUEL DENS:

	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	AVERAGE	% ST.DEV
PRES DIFF (Pa):	277	277	277	278	278	277	0.20
EXHST TEMP (C):	195.4	195.4	195.5	195.6	195.5	195	0.04
HC (ppm) :	10	10	10	10	10	10.0	0.00
CO (%) :	0.04	0.04	0.04	0.04	0.04	0.040	0.00
CO2 (%) :	2.96	2.96	2.96	2.96	2.96	2.96	0.00
O2 (%) :	18.98	18.98	18.98	18.94	18.94	18.96	0.12
CARB FLOW(g/s):	2.149	2.149	2.148	2.152	2.152	2.150	0.09

REYNOLDS NR. : 6.95E+04

TREATED - LOADED — DATE : 14.11.91

KILOMETRES : 439561 — TEST MODE: 1700 RPM MAXI ON
AMB. TEMP (C) : 16.5 — STACK(mm): 115
BAROMETRIC(mb): 1010 — FUEL DENS:

	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	AVERAGE	% ST.DEV
PRES DIFF (Pa):	266	268	268	265	265	266	0.57
EXHST TEMP (C):	194.6	196.2	196.3	213.4	213.4	203	4.79
HC (ppm) :	10	10	10	10	10	10.0	0.00
CO (%) :	0.04	0.04	0.04	0.04	0.04	0.040	0.00
CO2 (%) :	2.86	2.86	2.86	2.87	2.86	2.86	0.16
O2 (%) :	18.84	18.83	18.84	18.83	18.83	18.83	0.03
CARB FLOW(g/s):	2.030	2.034	2.033	1.993	1.986	2.015	1.17

REYNOLDS NR. : 6.73E+04 — TOTAL KILOMETRES ON TREATED FUEL 73893

PERCENTAGE CHANGE IN FUEL CONSUMPTION ((TREATED-BASE)/BASE*100) : -6.3 %

REMARKS:

FUEL TECHNOLOGY PTY LTD CARBON BALANCE RESULTS

COMPANY : BRAMBLES LOCATION : MUCHEA

EQUIPMENT : VOLVO F12 ROAD TRAIN UNIT NR. : PO 78
ENG. TYPE : VOLVO MODEL :
RATING : FUEL :

BASELINE - NO LOAD DATE : 29/8/91

KILOMETRES : 423275 TEST MODE: 1700 RPM MAXI OFF
AMB. TEMP (C) : 16.2 STACK(mm): 115
BAROMETRIC(mb): 1018 FUEL DENS:

	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	AVERAGE	% ST.DEV
PRES DIFF (Pa):	299	299	299	299	299	299	0.00
EXHST TEMP (C):	144.1	144.3	144.4	144.6	144.8	144	0.19
HC (ppm) :	10	10	10	10	10	10.0	0.00
CO (%) :	0.03	0.03	0.03	0.03	0.03	0.030	0.00
CO2 (%) :	1.94	1.94	1.94	1.95	1.94	1.94	0.23
O2 (%) :	19.49	19.49	19.49	19.49	19.51	19.49	0.05
CARB FLOW(g/s):	1.556	1.555	1.555	1.563	1.554	1.557	0.22

REYNOLDS NR. : 7.65E+04

TREATED - NO LOAD DATE :14.11.91

KILOMETRES : 493129 TEST MODE: 1700 RPM MAXI OFF
AMB. TEMP (C) : 18.4 STACK(mm): 115
BAROMETRIC(mb): 1010 FUEL DENS:

	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	AVERAGE	% ST.DEV
PRES DIFF (Pa):	258	252	253	254	254	254	0.90
EXHST TEMP (C):	145.5	145.9	146.1	146.4	146.7	146	0.32
HC (ppm) :	10	10	10	10	10	10.0	0.00
CO (%) :	0.04	0.04	0.04	0.04	0.04	0.040	0.00
CO2 (%) :	1.99	1.99	1.99	1.99	1.99	1.99	0.00
O2 (%) :	19.63	19.63	19.63	19.63	19.64	19.63	0.02
CARB FLOW(g/s):	1.480	1.462	1.465	1.467	1.467	1.468	0.48

REYNOLDS NR. : 7.01E+04 TOTAL KILOMETRES ON TREATED FUEL 69854

PERCENTAGE CHANGE IN FUEL CONSUMPTION ((TREATED-BASE)/BASE*100) : -5.7 %

REMARKS:

FUEL TECHNOLOGY PTY LTD — CARBON BALANCE RESULTS

COMPANY : BRAMBLES — LOCATION : MUCHEA

EQUIPMENT : VOLVO F12 ROAD TRAIN — UNIT NR. : PO 78
ENG. TYPE : VOLVO — MODEL :
RATING : — FUEL :

BASELINE - NO LOAD — DATE : 29/8/91

KILOMETRES : 423275 — TEST MODE: 1700 RPM MAXI ON
AMB. TEMP (C) : 16.2 — STACK(mm): 115
BAROMETRIC(mb): 1018 — FUEL DENS:

	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	AVERAGE	% ST.DEV
PRES DIFF (Pa):	259	259	256	257	258	258	0.51
EXHST TEMP (C):	221	221.2	221.5	221.7	222.2	222	0.21
HC (ppm) :	10	10	10	10	10	10.0	0.00
CO (%) :	0.03	0.03	0.03	0.03	0.03	0.030	0.00
CO2 (%) :	3.00	3.00	3.00	3.00	3.00	3.00	0.00
O2 (%) :	18.78	18.77	18.77	18.77	18.77	18.77	0.02
CARB FLOW(g/s):	2.043	2.043	2.031	2.034	2.037	2.038	0.28

REYNOLDS NR. : 6.52E+04

TREATED - LOADED — DATE : 14.11.91

KILOMETRES : 493129 — TEST MODE: 1650 RPM MAXI ON
AMB. TEMP (C) : 18.4 — STACK(mm): 115
BAROMETRIC(mb): 1010 — FUEL DENS:

	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	AVERAGE	% ST.DEV
PRES DIFF (Pa):	211	211	212	213	212	212	0.40
EXHST TEMP (C):	220.1	220.7	221	221.3	221.5	221	0.25
HC (ppm) :	10	10	10	10	10	10.0	0.00
CO (%) :	0.03	0.03	0.03	0.03	0.03	0.030	0.00
CO2 (%) :	3.09	3.09	3.08	3.09	3.09	3.09	0.14
O2 (%) :	18.63	18.63	18.63	18.63	18.62	18.63	0.02
CARB FLOW(g/s):	1.893	1.892	1.890	1.900	1.895	1.894	0.20

REYNOLDS NR. : 5.89E+04 — TOTAL KILOMETRES ON TREATED FUEL 69854

PERCENTAGE CHANGE IN FUEL CONSUMPTION ((TREATED-BASE)/BASE*100) : -7.0 %

REMARKS:

FUEL TECHNOLOGY PTY LTD — CARBON BALANCE RESULTS

COMPANY : BRAMBLES — LOCATION : MUCHEA

EQUIPMENT : VOLVO F12 ROAD TRAIN — UNIT NR. : P079
ENG. TYPE : VOLVO — MODEL :
RATING : — FUEL :

BASELINE - NO LOAD — DATE : 29/8/91

KILOMETRES : 385212 — TEST MODE: 1700 RPM MAXI OFF
AMB. TEMP (C) : 15.7 — STACK(mm): 115
BAROMETRIC(mb): 1018 — FUEL DENS:

	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	AVERAGE	% ST.DEV
PRES DIFF (Pa):	252	252	252	252	252	252	0.00
EXHST TEMP (C):	146.7	146.8	147	147.1	147.3	147	0.16
HC (ppm) :	10	10	10	10	10	10.0	0.00
CO (%) :	0.03	0.03	0.03	0.03	0.03	0.030	0.00
CO2 (%) :	1.90	1.90	1.91	1.90	1.90	1.90	0.24
O2 (%) :	19.51	19.51	19.51	19.49	19.49	19.50	0.06
CARB FLOW(g/s):	1.395	1.395	1.402	1.394	1.394	1.396	0.23

REYNOLDS NR. : 7.00E+04

TREATED - NO LOAD — DATE : 14.11.91

KILOMETRES : 454901 — TEST MODE: 1700 RPM MAXI OFF
AMB. TEMP (C) : 17.4 — STACK(mm): 115
BAROMETRIC(mb): 1010 — FUEL DENS:

	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	AVERAGE	% ST.DEV
PRES DIFF (Pa):	245	247	247	247	248	247	0.44
EXHST TEMP (C):	150.9	150.9	151.1	151.2	151.3	151	0.12
HC (ppm) :	10	10	10	10	10	10.0	0.00
CO (%) :	0.03	0.03	0.03	0.03	0.03	0.030	0.00
CO2 (%) :	1.80	1.81	1.81	1.81	1.81	1.81	0.25
O2 (%) :	19.03	19.03	19.03	19.03	19.03	19.03	0.00
CARB FLOW(g/s):	1.293	1.306	1.305	1.305	1.308	1.303	0.44

REYNOLDS NR. : 6.87E+04 — TOTAL KILOMTRES ON TREATED FUEL: 69689

PERCENTAGE CHANGE IN FUEL CONSUMPTION ((TREATED-BASE)/BASE*100) : -6.6 %

REMARKS:

FUEL TECHNOLOGY PTY LTD — CARBON BALANCE RESULTS

COMPANY : BRAMBLES — LOCATION : MUCHEA

EQUIPMENT : VOLVO F12 ROAD TRAIN — UNIT NR. : P079
ENG. TYPE : VOLVO — MODEL :
RATING : — FUEL :

BASELINE - LOADED — DATE : 29/8/91

KILOMETRES : 385212 — TEST MODE: 1700 RPM MAXI ON
AMB. TEMP (C) : 15.7 — STACK(mm): 115
BAROMETRIC(mb): 1018 — FUEL DENS:

	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	AVERAGE	% ST.DEV
PRES DIFF (Pa):	282	282	282	281	283	282	0.25
EXHST TEMP (C):	228.1	228.2	228.4	228.6	228.9	228	0.14
HC (ppm) :	10	10	10	10	10	10.0	0.00
CO (%) :	0.03	0.03	0.03	0.03	0.03	0.030	0.00
CO2 (%) :	3.02	3.03	3.00	3.03	3.00	3.02	0.50
O2 (%) :	18.62	18.62	18.62	18.62	18.62	18.62	0.00
CARB FLOW(g/s):	2.131	2.138	2.117	2.133	2.119	2.128	0.43

REYNOLDS NR. : 6.78E+04

TREATED - LOADED — DATE : 14.11.91

KILOMETRES : 454901 — TEST MODE: 1700 RPM MAXI ON
AMB. TEMP (C) : 17.4 — STACK(mm): 115
BAROMETRIC(mb): 1010 — FUEL DENS:

	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	AVERAGE	% ST.DEV
PRES DIFF (Pa):	233	232	233	235	234	233	0.49
EXHST TEMP (C):	210.3	210.3	210.5	210.9	211.1	211	0.17
HC (ppm) :	10	10	10	10	10	10.0	0.00
CO (%) :	0.04	0.04	0.04	0.04	0.04	0.040	0.00
CO2 (%) :	2.97	2.95	2.96	2.96	2.96	2.96	0.24
O2 (%) :	18.62	18.62	18.61	18.61	18.61	18.61	0.03
CARB FLOW(g/s):	1.939	1.922	1.932	1.940	1.935	1.934	0.37

REYNOLDS NR. : 6.25E+04 — TOTAL KILOMETRES ON TREATED FUEL 69689

PERCENTAGE CHANGE IN FUEL CONSUMPTION ((TREATED-BASE)/BASE*100) : -9.1 %

REMARKS:

FUEL TECHNOLOGY PTY LTD — CARBON BALANCE RESULTS

COMPANY : BRAMBLES — LOCATION : MUCHEA

EQUIPMENT : VOLVO F12 ROAD TRAIN — UNIT NR. : P081
ENG. TYPE : VOLVO — MODEL :
RATING : — FUEL :

BASELINE - NO LOAD — DATE : 29/8/91

KILOMETRES : 215083 — TEST MODE: 1700 RPM MAXI OFF
AMB. TEMP (C) : 15.8 — STACK(mm): 115
BAROMETRIC(mb): 1018 — FUEL DENS:

	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	AVERAGE	% ST.DEV
PRES DIFF (Pa):	288	288	288	289	289	288	0.19
EXHST TEMP (C):	155.2	152.2	155.3	155.4	155.5	155	0.91
HC (ppm) :	10	10	10	10	10	10.0	0.00
CO (%) :	0.03	0.03	0.03	0.03	0.03	0.030	0.00
CO2 (%) :	2.01	2.01	2.01	2.01	2.01	2.01	0.00
O2 (%) :	19.59	19.58	19.58	19.58	19.58	19.58	0.02
CARB FLOW(g/s):	1.560	1.565	1.560	1.562	1.562	1.562	0.15

REYNOLDS NR. : 7.42E+04

TREATED - NO LOAD — DATE : 14.11.91

KILOMETRES : 294268 — TEST MODE: 1645 RPM MAXI OFF
AMB. TEMP (C) : 16.2 — STACK(mm): 115
BAROMETRIC(mb): 1010 — FUEL DENS:

	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	AVERAGE	% ST.DEV
PRES DIFF (Pa):	264	263	264	265	268	265	0.73
EXHST TEMP (C):	150.1	150.1	150.2	151.9	152	151	0.66
HC (ppm) :	0	0	0	0	0	0.0	#DIV/0!
CO (%) :	0.04	0.04	0.04	0.04	0.04	0.040	0.00
CO2 (%) :	1.99	1.99	1.99	1.99	1.99	1.99	0.00
O2 (%) :	19.91	19.91	19.91	19.91	19.92	19.91	0.02
CARB FLOW(g/s):	1.485	1.482	1.484	1.484	1.493	1.486	0.27

REYNOLDS NR. : 7.11E+04 — TOTAL KILOMETRES ON TREATED FUEL 79185

PERCENTAGE CHANGE IN FUEL CONSUMPTION ((TREATED-BASE)/BASE*100) : -4.9 %

REMARKS:

FUEL TECHNOLOGY PTY LTD — CARBON BALANCE RESULTS

COMPANY : BRAMBLES — LOCATION : MUCHEA

EQUIPMENT : VOLVO F12 ROAD TRAIN — UNIT NR. : P081
ENG. TYPE : VOLVO — MODEL :
RATING : — FUEL :

BASELINE - LOADED — DATE : 29/8/91

KILOMETRES : 215083 — TEST MODE: 1700 RPM MAXI ON
AMB. TEMP (C) : 15.8 — STACK(mm): 115
BAROMETRIC(mb): 1018 — FUEL DENS:

	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	AVERAGE	% ST.DEV
PRES DIFF (Pa):	250	250	250	250	250	250	0.00
EXHST TEMP (C):	220.2	220.4	220.6	220.6	220.7	221	0.09
HC (ppm) :	10	10	10	10	10	10.0	0.00
CO (%) :	0.03	0.03	0.03	0.03	0.03	0.030	0.00
CO2 (%) :	2.90	2.90	2.91	2.91	2.90	2.90	0.19
O2 (%) :	18.76	18.76	18.76	18.76	18.76	18.76	0.00
CARB FLOW(g/s):	1.943	1.943	1.949	1.949	1.942	1.945	0.18

REYNOLDS NR. : 6.43E+04

TREATED - LOADED — DATE : 14.11.91

KILOMETRES : 294268 — TEST MODE: 1645 RPM MAXI ON
AMB. TEMP (C) : 16.2 — STACK(mm): 115
BAROMETRIC(mb): 1010 — FUEL DENS:

	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	AVERAGE	% ST.DEV
PRES DIFF (Pa):	238	237	236	237	238	238	0.23
EXHST TEMP (C):	218.5	218.5	218.7	218.9	219	219	0.10
HC (ppm) :	0	0	0	0	0	0.0	#DIV/0!
CO (%) :	0.03	0.03	0.03	0.03	0.03	0.030	0.00
CO2 (%) :	2.85	2.85	2.84	2.84	2.84	2.84	0.19
O2 (%) :	18.67	18.66	18.66	18.66	18.66	18.66	0.02
CARB FLOW(g/s):	1.856	1.852	1.849	1.845	1.849	1.850	0.22

REYNOLDS NR. : 6.26E+04 — TOTAL KILOMETRES ON TREATED FUEL 79185

PERCENTAGE CHANGE IN FUEL CONSUMPTION ((TREATED-BASE)/BASE*100) : -4.9 %

REMARKS: