APPENDIX A

Comparison of DT80 Data to Emission Factor Predictions

PBC provided PAEHolmes with DT80 emission test reports for two relatively new trucks that operate in the Port of Brisbane Area. The DT80 test is a (non-mandatory) Australian **in-service** emissions test that is conducted to assess emissions performance of on-road diesel vehicles. The main aim of the test is to identify possible vehicle faults that adversely affect emissions and repair them ("test and repair program"). The test procedure is currently under review as there is a desire to improve on test accuracy and test applicability (e.g. appropriate standards for current vehicles and new technologies coming to market).

The DT80 vehicle emissions test simulates worst-case driving conditions (e.g. full open throttle acceleration, high cruise speeds) in order to capture worst-case emission levels. This is quite different from the representative real-world driving cycles (CUEDC-D) on which the emission factors in this study are based. In addition, measurement equipment used in the DT80 test can be different from the ones used in the laboratory tests (e.g. filter/TEOM versus LLSP), although they are corrected for this. Also, there is naturally a large variability in vehicle emissions, which limits the validity of comparing only one particular vehicle to the mean emissions value of a number of vehicles. A comparison between the emission factors database is presented in Table 12.1.

Table 12.1: Comparison of DT80 Test Results to Current Emission Factors

Pollutant	DT80 Test 2006 Kenworth T404 6x4 Prime, GCM: 120 000 kg	EF Database (40 kmph) ADR 80/00 Semi-trailer, GCM: 38 000 kg	DT80 Test 2008 Iveco Powerstar 500 6x 4 GCM: 72 000 kg	EF Database (40 kmph) ADR 80/02 Semi-trailer GCM: 38 000 kg
NO_x [g/km]	29.14	10.16	7.53	7.11
PM [mg/km]	108	48	51	10
CO_2 [g/km]	4318	1476	2811	1476

Interestingly, except for Iveco (NO_x), the DT80 results are a factor of 2-5 higher than the emission factor database values. There are several reasons for this including:

- the severity of the DT80 drive cycle;
- inter-vehicle variability; and
- the vehicle test mass.

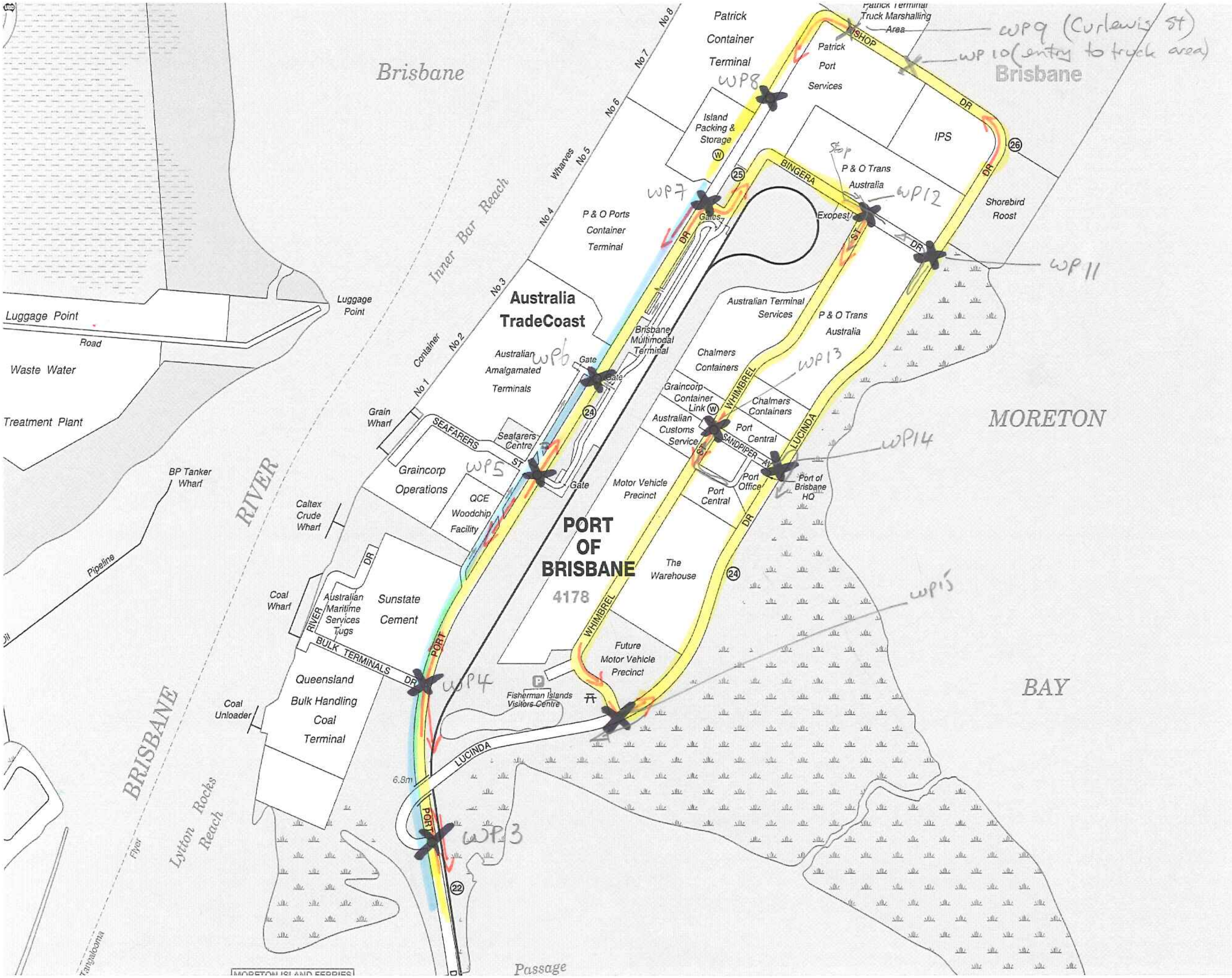
The vehicle test mass is a factor of 1.6 (Iveco, DT80 test mass of 40 tonne) to 2.5 (Kenworth, DT80 test mass of 65 tonne) higher than the typical test mass of 26 tonne for the "semi-trailer" in the emission factor database. When the database emission factors are multiplied with these factors the results for the Kenworth truck become almost equivalent to the scaled emission factors (± 14%), whereas for the Iveco truck, the scaled emission factors for CO_2 (-20%) and PM (-70%) improve, but are not as close. The scaled emission factor for NO_x actually is less accurate than the unscaled emission factor, and this is due to its use of SCR technology[k] that substantially reduces NO_x emissions. The comparison shows that the scaling approach works well for similar technology vehicles.

[k] Selective Catalytic Reduction is the technology that Iveco has chosen to meet the EURO 4 and EURO 5 emissions standards across its range of Stralis, Powerstar and Eurocargo models (http://www.iveco.com.au/powerstar_engine.HTM).

APPENDIX B

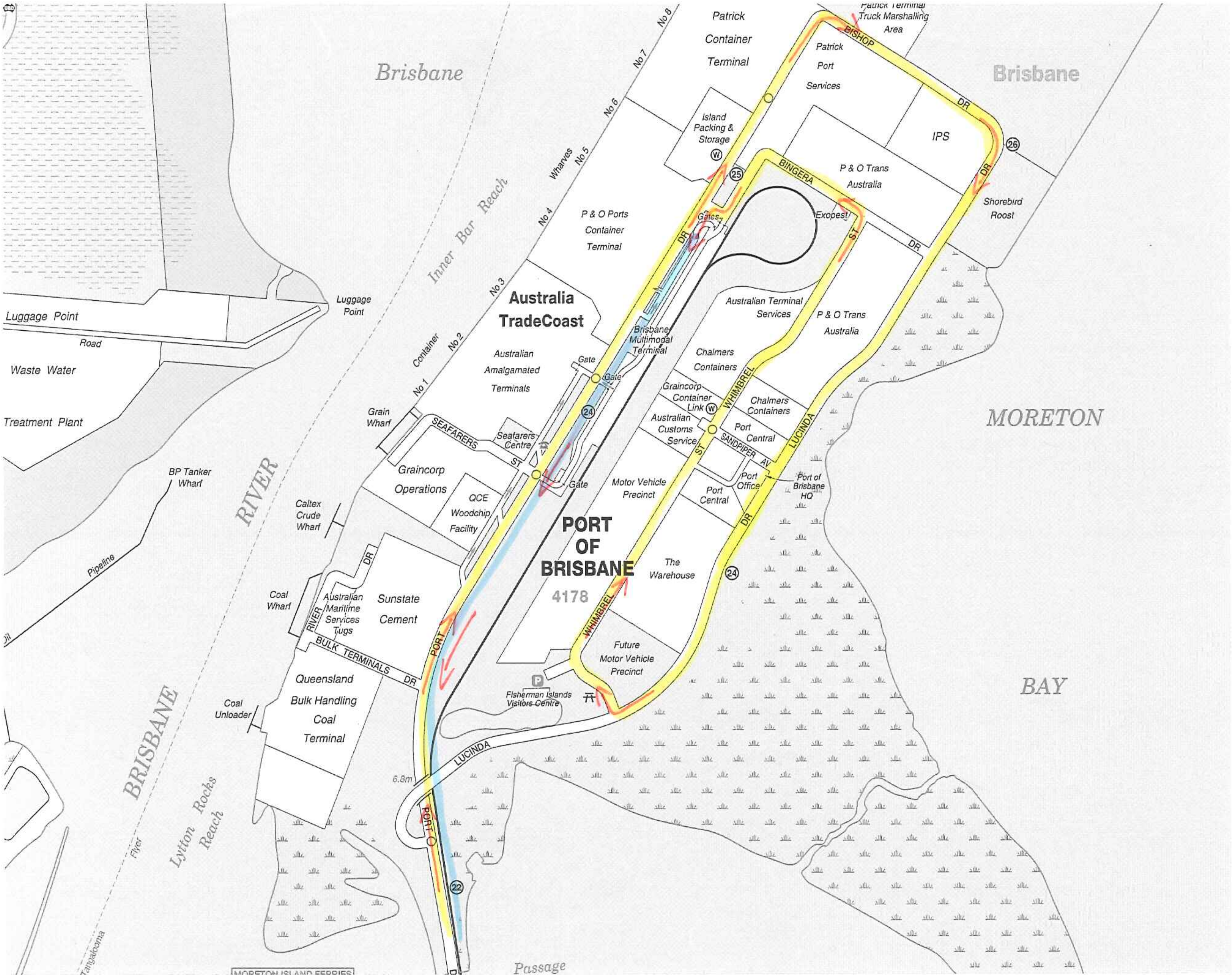
Average Speed Survey Routes

A

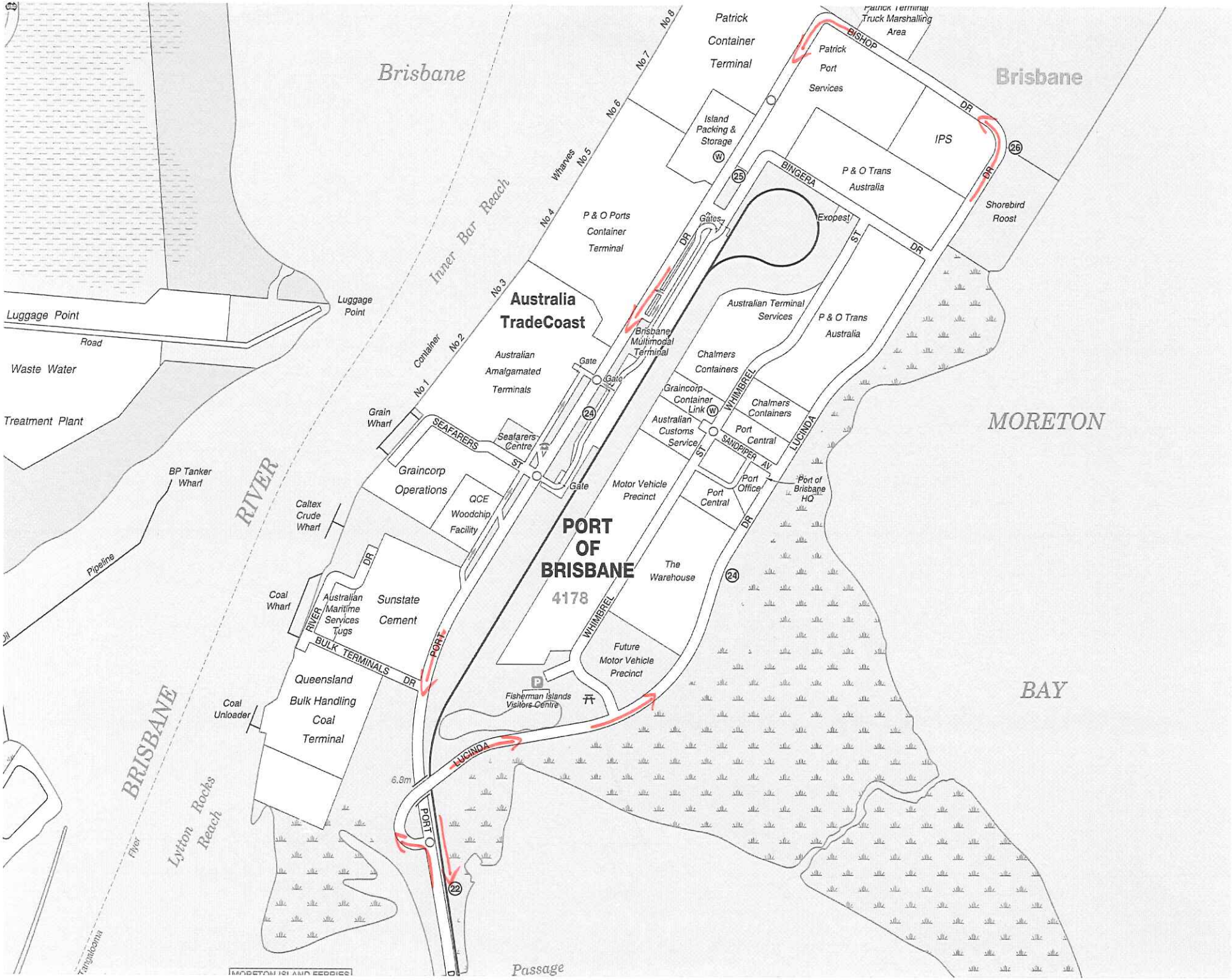


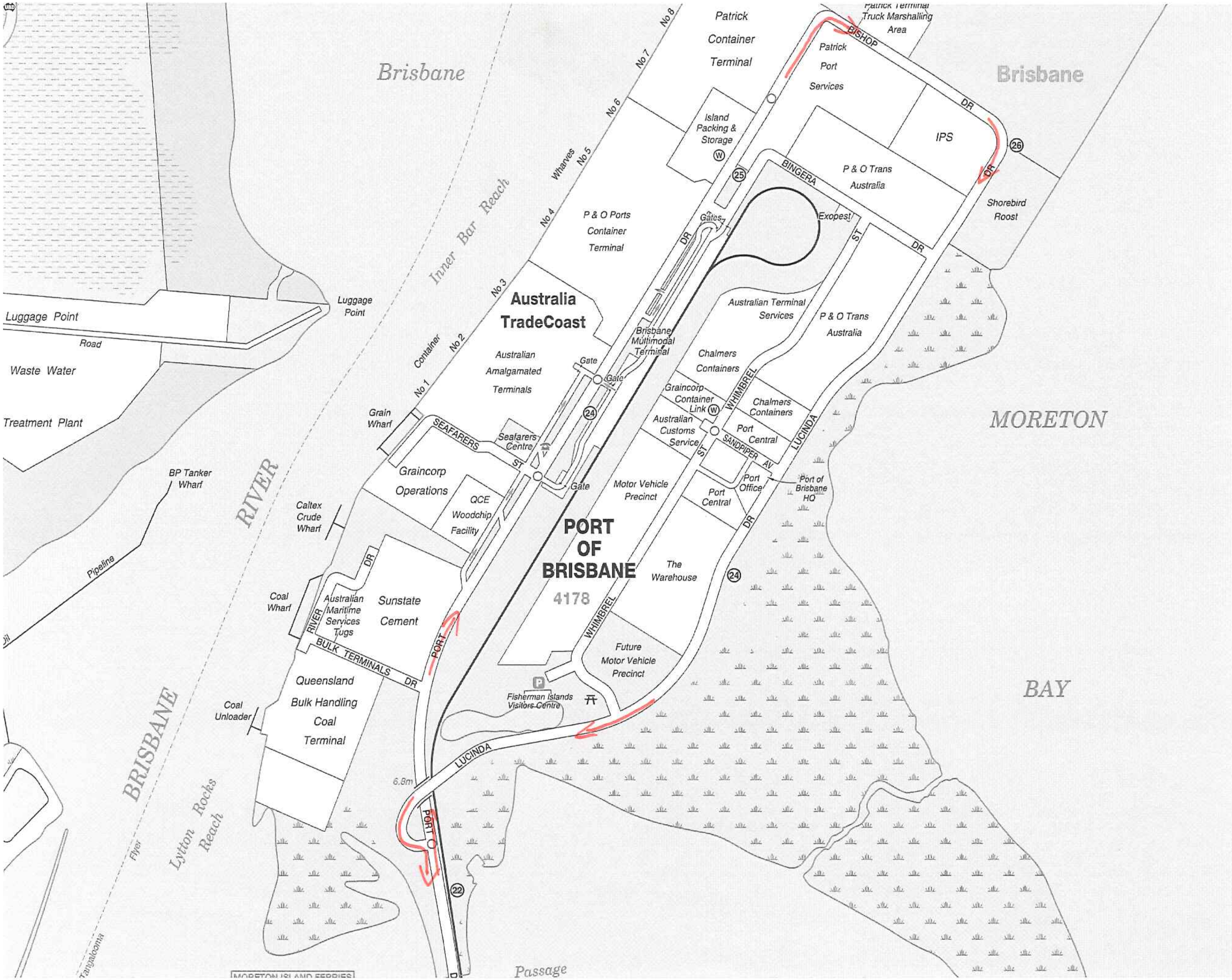
wp9 (Curlewis St)
wp10 (entry to truck area)
wp8
wp7
wp6
wp5
wp4
wp3
wp11
wp12
wp13
wp14
wp15
Stop
Patrick Terminal Truck Marshalling Area
BISHOP
DR
Patrick Port Services
IPS
Brisbane
Shorebird Roost
P & O Trans Australia
Exopest
BINGERA
ST
Patrick Container Terminal
Island Packing & Storage
Gates
P & O Ports Container Terminal
Wharves
No 8
No 7
No 6
No 5
No 4
No 3
No 2
No 1
Container
Inner Bar Reach
Brisbane
Luggage Point
Luggage Point Road
Waste Water Treatment Plant
Australia TradeCoast
Australian Amalgamated Terminals
Brisbane Multimodal Terminal
Gate
Australian Terminal Services
Chalmers Containers
Graincorp Container Link
Australian Customs Service
WHIMBREL
SANDPIPER
AV
LUCINDA
Port Central
Port Office
Port of Brisbane HQ
MORETON
BAY
Grain Wharf
SEAFARERS
Seafarers Centre
Graincorp Operations
QCE Woodchip Facility
Motor Vehicle Precinct
PORT OF BRISBANE
4178
The Warehouse
RIVER
BP Tanker Wharf
Caltex Crude Wharf
Pipeline
Coal Wharf
Australian Maritime Services Tugs
Sunstate Cement
BULK TERMINALS
PORT
Future Motor Vehicle Precinct
Fisherman Islands Visitors Centre
Queensland Bulk Handling Coal Terminal
Coal Unloader
BRISBANE
Lytton Rocks Reach
Flyer
Tangalooma
6.8m
Passage
MORETON ISLAND FERRIES

B



Brisbane
MORETON
BAY
Brisbane
BRISBANE
RIVER
Inner Bar Reach
Lytton Rocks Reach
PORT OF BRISBANE
4178
Australia TradeCoast
Patrick Terminal Truck Marshalling Area
Patrick Container Terminal
Patrick Port Services
IPS
Shorebird Roost
P & O Trans Australia
Island Packing & Storage
P & O Ports Container Terminal
Australian Terminal Services
Chalmers Containers
Graincorp Container Link
Australian Customs Service
Port Central
Port Office
Port of Brisbane HQ
Brisbane Multimodal Terminal
Exopest
Gates
Gate
Australian Amalgamated Terminals
Seafarers Centre
Graincorp Operations
QCE Woodchip Facility
Motor Vehicle Precinct
The Warehouse
Future Motor Vehicle Precinct
Fisherman Islands Visitors Centre
Sunstate Cement
Australian Maritime Services Tugs
Queensland Bulk Handling Coal Terminal
Coal Unloader
Coal Wharf
Caltex Crude Wharf
Grain Wharf
Container
Wharves
No 1
No 2
No 3
No 4
No 5
No 6
No 7
No 8
Luggage Point
Luggage Point Road
Waste Water Treatment Plant
BP Tanker Wharf
Pipeline
BISHOP DR
BINGERA ST
WHIMBREL ST
LUCINDA DR
SANDPIPER AV
SEAFARERS ST
PORT DR
BULK TERMINALS DR
RIVER DR
LUCINDA
PORT
6.8m
Passage
Flyer
MORETON ISLAND FERRIES


Brisbane
Patrick Container Terminal
Patrick Terminal Truck Marshalling Area
Patrick Port Services
Brisbane
Island Packing & Storage
IPS
P & O Trans Australia
Shorebird Roost
Exopest
Inner Bar Reach
Wharves
No 8
No 7
No 6
No 5
No 4
No 3
No 2
No 1
P & O Ports Container Terminal
Australia TradeCoast
Australian Amalgamated Terminals
Brisbane Multimodal Terminal
Australian Terminal Services
P & O Trans Australia
Chalmers Containers
Graincorp Container Link
Chalmers Containers
Australian Customs Service
Port Central
Port Office
Port of Brisbane HQ
Port Central
Motor Vehicle Precinct
The Warehouse
Future Motor Vehicle Precinct
PORT OF BRISBANE
4178
Fisherman Islands Visitors Centre
Graincorp Operations
QCE Woodchip Facility
Seafarers Centre
Grain Wharf
Caltex Crude Wharf
Coal Wharf
Australian Maritime Services Tugs
Sunstate Cement
Queensland Bulk Handling Coal Terminal
Coal Unloader
Luggage Point
Luggage Point Road
Waste Water Treatment Plant
BP Tanker Wharf
Pipeline
RIVER
BRISBANE
River
Lytton Rocks Reach
Tangalooma
MORETON
BAY
Passage
MORETON ISLAND FERRIES
BISHOP
BINGERA
DR
ST
AV
SEAFARERS
WHIMBREL
SANDPIPER
LUCINDA
PORT
BULK TERMINALS
RIVER
Gate
Gates
6.8m
22
24
25
26



Brisbane
MORETON
BAY
Patrick Container Terminal
Patrick Terminal Truck Marshalling Area
BISHOP
Patrick Port Services
DR
IPS
26
Shorebird Roost
Island Packing & Storage
25
BINGERA
P & O Trans Australia
Exopest
ST
P & O Ports Container Terminal
Gates
No 8
No 7
No 6
No 5
Wharves
No 4
No 3
No 2
No 1
Container
Inner Bar Reach
Australia TradeCoast
Australian Amalgamated Terminals
Brisbane Multimodal Terminal
Gate
24
Australian Terminal Services
Chalmers Containers
Graincorp Container Link
WHIMBREL
Australian Customs Service
SANDPIPER AV
Port Central
LUCINDA
Port Office
Port of Brisbane HQ
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SEAFARERS
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RIVER
Caltex Crude Wharf
Coal Wharf
Australian Maritime Services Tugs
Sunstate Cement
BULK TERMINALS
PORT
Queensland Bulk Handling Coal Terminal
Coal Unloader
BRISBANE
Lytton Rocks Reach
Flyer
Tangalooma
6.8m
22
Passage
MORETON ISLAND FERRIES

APPENDIX C

PoB CHE Survey

Equipment Type*	Qty	Chassis		Engine				Fuel Used		Estimated or Measured Equipment Use		Cumul.	Typical Fuel Use in Litres (optional)
		Make & Model	Model Year	Model	Model Yr (& Service Start Date**)	Retrofit Or Repower (Y/N)	Rated HP	Petrol (P); Diesel (D); LNG; CNG or LPG	Diesel Sulphur Content, if applic-able	Number of Hours or kms - Hours for 2007/2008	Unit of Measure (day, week, annual etc)	Use (Engine Hours or kms) as at 30/06/08	Annually for 2007/2008

APPENDIX D

CHE Engine US Emission Standards Breakdown by Manufactured Year

Engine Power Range (Hp)	Engine Manufactured Range	Fraction of Engines at US Engine Standard				
		B	T0	T1	T2	T3
0 – 11	<1995	1	0	0	0	0
11 – 16	<1995	1	0	0	0	0
16 - 25	<1995	1	0	0	0	0
25 - 50	<1995	1	0	0	0	0
50 - 75	<1995	1	0	0	0	0
75 - 100	<1995	1	0	0	0	0
100 – 175	<1995	1	0	0	0	0
175 – 300	<1995	1	0	0	0	0
300 – 600	<1995	1	0	0	0	0
600 – 750	<1995	1	0	0	0	0
750 - 9999	<1995	1	0	0	0	0
0 – 11	1995	0	1	0	0	0
11 – 16	1995	0	1	0	0	0
16 - 25	1995	0	1	0	0	0
25 - 50	1995	0	1	0	0	0
50 - 75	1995	0	1	0	0	0
75 - 100	1995	0	1	0	0	0
100 – 175	1995	0	1	0	0	0
175 – 300	1995	0	1	0	0	0
300 – 600	1995	0	1	0	0	0
600 – 750	1995	0	1	0	0	0
750 - 9999	1995	0	1	0	0	0
0 – 11	1996	0	1	0	0	0
11 – 16	1996	0	1	0	0	0
16 - 25	1996	0	1	0	0	0
25 - 50	1996	0	1	0	0	0
50 - 75	1996	0	1	0	0	0
75 - 100	1996	0	1	0	0	0
100 – 175	1996	0	1	0	0	0
175 – 300	1996	0	0	1	0	0
300 – 600	1996	0	0	1	0	0
600 – 750	1996	0	0	1	0	0
750 - 9999	1996	0	1	0	0	0
0 – 11	1997	0	1	0	0	0
11 – 16	1997	0	1	0	0	0
16 - 25	1997	0	1	0	0	0
25 - 50	1997	0	1	0	0	0
50 - 75	1997	0	1	0	0	0
75 - 100	1997	0	1	0	0	0
100 – 175	1997	0	1	0	0	0
175 – 300	1997	0	0	1	0	0
300 – 600	1997	0	0	1	0	0
600 – 750	1997	0	0	1	0	0
750 - 9999	1997	0	1	0	0	0
0 – 11	1998	0	1	0	0	0
11 – 16	1998	0	1	0	0	0
16 - 25	1998	0	1	0	0	0
25 - 50	1998	0	1	0	0	0
50 - 75	1998	0	0	1	0	0
75 - 100	1998	0	0	1	0	0
100 – 175	1998	0	0	1	0	0
175 – 300	1998	0	0	1	0	0

Engine Power Range (Hp)	Engine Manufactured Range	Fraction of Engines at US Engine Standard				
		B	T0	T1	T2	T3
300 – 600	1998	0	0	1	0	0
600 – 750	1998	0	0	1	0	0
750 - 9999	1998	0	1	0	0	0
0 – 11	1999	0	1	0	0	0
11 – 16	1999	0	0.2	0.8	0	0
16 - 25	1999	0	0.2	0.8	0	0
25 - 50	1999	0	0.2	0.8	0	0
50 - 75	1999	0	0	1	0	0
75 - 100	1999	0	0	1	0	0
100 – 175	1999	0	0	1	0	0
175 – 300	1999	0	0	1	0	0
300 – 600	1999	0	0	1	0	0
600 – 750	1999	0	0	1	0	0
750 - 9999	1999	0	1	0	0	0
0 – 11	2000	0	0.2	0.8	0	0
11 – 16	2000	0	0.2	0.8	0	0
16 - 25	2000	0	0.2	0.8	0	0
25 - 50	2000	0	0.2	0.8	0	0
50 - 75	2000	0	0	1	0	0
75 - 100	2000	0	0	1	0	0
100 – 175	2000	0	0	1	0	0
175 – 300	2000	0	0	1	0	0
300 – 600	2000	0	0	1	0	0
600 – 750	2000	0	0	1	0	0
750 - 9999	2000	0	0	1	0	0
0 – 11	2001	0	0.2	0.8	0	0
11 – 16	2001	0	0.1	0.9	0	0
16 - 25	2001	0	0.1	0.9	0	0
25 - 50	2001	0	0.1	0.9	0	0
50 - 75	2001	0	0	1	0	0
75 - 100	2001	0	0	1	0	0
100 – 175	2001	0	0	1	0	0
175 – 300	2001	0	0	1	0	0
300 – 600	2001	0	0	1	0	0
600 – 750	2001	0	0	1	0	0
750 - 9999	2001	0	0	1	0	0
0 – 11	2002	0	0.1	0.9	0	0
11 – 16	2002	0	0.1	0.9	0	0
16 - 25	2002	0	0.1	0.9	0	0
25 - 50	2002	0	0.1	0.9	0	0
50 - 75	2002	0	0	1	0	0
75 - 100	2002	0	0	1	0	0
100 – 175	2002	0	0	1	0	0
175 – 300	2002	0	0	1	0	0
300 – 600	2002	0	0	0.2	0.8	0
600 – 750	2002	0	0	0.2	0.8	0
750 - 9999	2002	0	0	1	0	0
0 – 11	2003	0	0.1	0.9	0	0
11 – 16	2003	0	0.1	0.9	0	0
16 - 25	2003	0	0.1	0.9	0	0
25 - 50	2003	0	0.1	0.9	0	0
50 - 75	2003	0	0	1	0	0

Engine Power Range (Hp)	Engine Manufactured Range	Fraction of Engines at US Engine Standard				
		B	T0	T1	T2	T3
75 - 100	2003	0	0	1	0	0
100 – 175	2003	0	0	1	0	0
175 – 300	2003	0	0	0.2	0.8	0
300 – 600	2003	0	0	0.2	0.8	0
600 – 750	2003	0	0	0.2	0.8	0
750 - 9999	2003	0	0	1	0	0
0 – 11	2004	0	0.1	0.9	0	0
11 – 16	2004	0	0.1	0	0.9	0
16 - 25	2004	0	0.1	0	0.9	0
25 - 50	2004	0	0.1	0	0.9	0
50 - 75	2004	0	0	0.2	0.8	0
75 - 100	2004	0	0	0.2	0.8	0
100 – 175	2004	0	0	0.2	0.8	0
175 – 300	2004	0	0	0.2	0.8	0
300 – 600	2004	0	0	0.1	0.9	0
600 – 750	2004	0	0	0.1	0.9	0
750 - 9999	2004	0	0	1	0	0
0 – 11	2005	0	0.1	0	0.9	0
11 – 16	2005	0	0	0	1	0
16 - 25	2005	0	0	0	1	0
25 - 50	2005	0	0	0	1	0
50 - 75	2005	0	0	0.2	0.8	0
75 - 100	2005	0	0	0.2	0.8	0
100 – 175	2005	0	0	0.2	0.8	0
175 – 300	2005	0	0	0.1	0.9	0
300 – 600	2005	0	0	0.1	0.9	0
600 – 750	2005	0	0	0.1	0.9	0
750 - 9999	2005	0	0	1	0	0
0 – 11	2006	0	0	0	1	0
11 – 16	2006	0	0	0	1	0
16 - 25	2006	0	0	0	1	0
25 - 50	2006	0	0	0	1	0
50 - 75	2006	0	0	0.1	0.9	0
75 - 100	2006	0	0	0.1	0.9	0
100 – 175	2006	0	0	0.1	0.9	0
175 – 300	2006	0	0	0.1	0	0.9
300 – 600	2006	0	0	0.1	0	0.9
600 – 750	2006	0	0	0.1	0	0.9
750 - 9999	2006	0	0	0.3	0.7	0
0 – 11	2007	0	0	0	1	0
11 – 16	2007	0	0	0	1	0
16 - 25	2007	0	0	0	1	0
25 - 50	2007	0	0	0	1	0
50 - 75	2007	0	0	0.1	0.9	0
75 - 100	2007	0	0	0.1	0.9	0
100 – 175	2007	0	0	0.1	0.9	0
175 – 300	2007	0	0	0.1	0	0.9
300 – 600	2007	0	0	0.1	0	0.9
600 – 750	2007	0	0	0.1	0	0.9
750 - 9999	2007	0	0	0.3	0.7	0
0 – 16	2008	0	0	0	1	0
16 - 25	2008	0	0	0	1	0

Engine Power Range (Hp)	Engine Manufactured Range	Fraction of Engines at US Engine Standard				
		B	T0	T1	T2	T3
25 - 50	2008	0	0	0	1	0
50 - 75	2008	0	0	0.1	0.9	0
75 - 100	2008	0	0	0.1	0.9	0
100 – 175	2008	0	0	0.1	0.9	0
175 – 300	2008	0	0	0.1	0	0.9
300 – 600	2008	0	0	0	0	1
600 – 750	2008	0	0	0	0	1
750 - 9999	2008	0	0	0.2	0.8	0

APPENDIX E

CHE Power Based Emission Factors

CHE Type	Fuel	Emission Factor g/Hp-hr unless otherwise stated											
		CO	THC	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	$CO_{2\text{-}e}$	$CO_{2\text{-}eNGA}$	FC
Forklift	LPG	7.71	1.01	12.05	0.052	0.00	0.00	753	0.36	0.02	768	730	260
Onsite Vehicle	Diesel	35.0 (g/l)	2.5 (g/l)	3.4 (g/l)	0.025	0.1 (g/l)	0.1 (g/l)	816	0.11	0.02	825	839	254
Onsite Vehicle	LPG	37.3 (g/l)	2.5 (g/l)	6.7 (g/l)	0.052	0.1 (g/l)	0.1 (g/l)	753	0.36	0.02	768	730	260
Onsite Vehicle	Petrol	30.8 (g/l)	6.3 (g/l)	38.6 (g/l)	0.054	4.9 (g/l)	4.7 (g/l)	846	0.36	0.09	883	835	271
Forklift	Diesel	10.26	2.11	12.87	0.025	1.65	1.58	807	0.11	0.02	815	839	251
Forklift	Diesel	10.26	2.11	12.87	0.025	1.65	1.58	807	0.11	0.02	815	839	251
Forklift	Diesel	8.44	1.07	6.73	0.025	0.74	0.71	807	0.11	0.02	815	839	251
Forklift	Diesel	8.44	0.78	5.54	0.025	0.82	0.78	807	0.11	0.02	815	839	251
Forklift	Diesel	8.44	0.78	5.54	0.025	0.82	0.78	807	0.11	0.02	815	839	251
Forklift	Diesel	10.26	2.39	10.94	0.025	1.48	1.41	807	0.11	0.02	815	839	251
Forklift	Diesel	10.26	2.39	10.94	0.025	1.48	1.41	807	0.11	0.02	815	839	251
Forklift	Diesel	4.44	0.62	5.71	0.025	0.44	0.42	807	0.11	0.02	815	839	251
Forklift	Diesel	4.44	0.62	5.71	0.025	0.44	0.42	807	0.11	0.02	815	839	251
Forklift	Diesel	4.44	0.62	5.71	0.025	0.44	0.42	807	0.11	0.02	815	839	251
Forklift	Diesel	10.26	2.39	10.94	0.025	1.48	1.41	807	0.11	0.02	815	839	251
Forklift	Diesel	10.26	2.39	10.94	0.025	1.48	1.41	807	0.11	0.02	815	839	251
Forklift	Diesel	4.44	0.62	5.71	0.025	0.44	0.42	807	0.11	0.02	815	839	251
Forklift	Diesel	4.44	0.62	5.71	0.025	0.44	0.42	807	0.11	0.02	815	839	251
Forklift	Diesel	4.44	0.62	5.71	0.025	0.44	0.42	807	0.11	0.02	815	839	251
Forklift	Diesel	10.26	2.52	8.88	0.025	1.31	1.26	807	0.11	0.02	815	839	251
Forklift	Diesel	10.26	2.52	8.88	0.025	1.31	1.26	807	0.11	0.02	815	839	251
Forklift	Diesel	3.14	0.39	6.09	0.025	0.56	0.54	807	0.11	0.02	815	839	251
Forklift	Diesel	3.14	0.39	6.09	0.025	0.56	0.54	807	0.11	0.02	815	839	251
Forklift	Diesel	3.14	0.39	6.09	0.025	0.56	0.54	807	0.11	0.02	815	839	251
Forklift	Diesel	6.22	1.57	18.02	0.025	1.65	1.58	807	0.11	0.02	815	839	251
Forklift	Diesel	7.16	1.38	8.88	0.025	1.19	1.14	807	0.11	0.02	815	839	251
Forklift	Diesel	4.85	0.72	7.20	0.025	0.78	0.75	807	0.11	0.02	815	839	251
Forklift	Diesel	4.85	0.51	6.05	0.025	0.39	0.37	807	0.11	0.02	815	839	251
Forklift	Diesel	4.85	0.25	4.25	0.025	0.59	0.57	807	0.11	0.02	815	839	251
Forklift	Diesel	6.22	1.57	18.02	0.025	1.65	1.58	807	0.11	0.02	815	839	251

CHE Type	Fuel	Emission Factor g/Hp-hr unless otherwise stated											
		CO	THC	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_{2-e}	CO_{2-eNGA}	FC
Forklift	Diesel	7.16	1.38	8.88	0.025	1.19	1.14	807	0.11	0.02	815	839	251
Forklift	Diesel	4.85	0.72	7.20	0.025	0.78	0.75	807	0.11	0.02	815	839	251
Forklift	Diesel	4.85	0.51	6.05	0.025	0.39	0.37	807	0.11	0.02	815	839	251
Forklift	Diesel	4.85	0.25	4.25	0.025	0.59	0.57	807	0.11	0.02	815	839	251
Forklift	Diesel	6.22	1.57	18.02	0.023	1.65	1.58	726	0.10	0.02	734	839	226
Forklift	Diesel	5.54	0.95	10.78	0.023	0.66	0.63	726	0.10	0.02	734	839	226
Forklift	Diesel	1.78	0.47	7.28	0.023	0.46	0.44	726	0.10	0.02	734	839	226
Forklift	Diesel	1.78	0.47	5.28	0.023	0.30	0.28	726	0.10	0.02	734	839	226
Forklift	Diesel	1.78	0.25	3.54	0.023	0.43	0.41	726	0.10	0.02	734	839	226
Forklift	Diesel	6.22	1.57	18.02	0.023	1.65	1.58	726	0.10	0.02	734	839	226
Forklift	Diesel	5.54	0.95	10.78	0.023	0.66	0.63	726	0.10	0.02	734	839	226
Forklift	Diesel	1.53	0.43	7.17	0.023	0.42	0.40	726	0.10	0.02	734	839	226
Forklift	Diesel	1.53	0.43	5.15	0.023	0.21	0.21	726	0.10	0.02	734	839	226
Forklift	Diesel	1.53	0.25	3.54	0.023	0.30	0.28	726	0.10	0.02	734	839	226
Forklift	Diesel	6.22	1.57	18.02	0.023	1.65	1.58	726	0.10	0.02	734	839	226
Forklift	Diesel	5.54	0.95	10.78	0.023	0.66	0.63	726	0.10	0.02	734	839	226
Forklift	Diesel	2.68	0.28	7.74	0.023	0.34	0.32	726	0.10	0.02	734	839	226
Forklift	Diesel	1.73	0.23	5.58	0.023	0.21	0.21	726	0.10	0.02	734	839	226
Forklift	Diesel	1.73	0.23	3.54	0.023	0.30	0.28	726	0.10	0.02	734	839	226
Forklift	Diesel	6.22	1.57	18.02	0.023	1.65	1.58	726	0.10	0.02	734	839	226
Forklift	Diesel	5.54	0.95	10.78	0.023	0.66	0.63	726	0.10	0.02	734	839	226
Forklift	Diesel	2.72	0.20	7.50	0.023	0.36	0.35	726	0.10	0.02	734	839	226
Forklift	Diesel	2.72	0.23	5.28	0.023	0.21	0.21	726	0.10	0.02	734	839	226
Forklift	Diesel	2.72	0.23	3.54	0.023	0.30	0.28	726	0.10	0.02	734	839	226
Forklift	Diesel	6.22	1.57	18.02	0.023	1.65	1.58	726	0.10	0.02	734	839	226
Forklift	Diesel	5.54	0.95	10.78	0.023	0.66	0.63	726	0.10	0.02	734	839	226
Forklift	Diesel	1.57	0.40	7.93	0.023	0.32	0.31	726	0.10	0.02	734	839	226
Forklift	Diesel	1.57	0.23	5.28	0.023	0.21	0.21	726	0.10	0.02	734	839	226
Forklift	Diesel	1.57	0.23	5.28	0.023	0.21	0.21	726	0.10	0.02	734	839	226
Other Industrial Equipment	Diesel	6.71	2.01	13.41	0.025	1.34	1.29	799	0.11	0.02	807	839	248
Other Industrial Equipment	Diesel	6.71	2.01	13.41	0.025	1.34	1.29	799	0.11	0.02	807	839	248

CHE Type	Fuel	Emission Factor g/Hp-hr unless otherwise stated											
		CO	THC	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	$CO_{2\text{-}e}$	$CO_{2\text{-}eNGA}$	FC
Other Industrial Equipment	Diesel	5.51	1.02	7.01	0.025	0.60	0.58	799	0.11	0.02	807	839	248
Other Industrial Equipment	Diesel	5.51	0.74	5.77	0.025	0.67	0.64	799	0.11	0.02	807	839	248
Other Industrial Equipment	Diesel	5.51	0.74	5.77	0.025	0.67	0.64	799	0.11	0.02	807	839	248
Other Industrial Equipment	Diesel	6.71	2.28	11.40	0.025	1.21	1.16	799	0.11	0.02	807	839	248
Other Industrial Equipment	Diesel	6.71	2.28	11.40	0.025	1.21	1.16	799	0.11	0.02	807	839	248
Other Industrial Equipment	Diesel	2.90	0.59	5.95	0.025	0.36	0.35	799	0.11	0.02	807	839	248
Other Industrial Equipment	Diesel	2.90	0.59	5.95	0.025	0.36	0.35	799	0.11	0.02	807	839	248
Other Industrial Equipment	Diesel	2.90	0.59	5.95	0.025	0.36	0.35	799	0.11	0.02	807	839	248
Other Industrial Equipment	Diesel	6.71	2.28	11.40	0.025	1.21	1.16	799	0.11	0.02	807	839	248
Other Industrial Equipment	Diesel	6.71	2.28	11.40	0.025	1.21	1.16	799	0.11	0.02	807	839	248
Other Industrial Equipment	Diesel	2.90	0.59	5.95	0.025	0.36	0.35	799	0.11	0.02	807	839	248
Other Industrial Equipment	Diesel	2.90	0.59	5.95	0.025	0.36	0.35	799	0.11	0.02	807	839	248
Other Industrial Equipment	Diesel	2.90	0.59	5.95	0.025	0.36	0.35	799	0.11	0.02	807	839	248
Other Industrial Equipment	Diesel	6.71	2.41	9.25	0.025	1.07	1.03	799	0.11	0.02	807	839	248
Other Industrial Equipment	Diesel	6.71	2.41	9.25	0.025	1.07	1.03	799	0.11	0.02	807	839	248
Other Industrial Equipment	Diesel	2.05	0.38	6.34	0.025	0.46	0.44	799	0.11	0.02	807	839	248

CHE Type	Fuel	Emission Factor g/Hp-hr unless otherwise stated											
		CO	THC	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	$CO_{2\text{-}e}$	$CO_{2\text{-}eNGA}$	FC
Other Industrial Equipment	Diesel	2.05	0.38	6.34	0.025	0.46	0.44	799	0.11	0.02	807	839	248
Other Industrial Equipment	Diesel	2.05	0.38	6.34	0.025	0.46	0.44	799	0.11	0.02	807	839	248
Other Industrial Equipment	Diesel	4.06	1.50	18.77	0.025	1.34	1.29	799	0.11	0.02	807	839	248
Other Industrial Equipment	Diesel	4.68	1.33	9.25	0.025	0.97	0.93	799	0.11	0.02	807	839	248
Other Industrial Equipment	Diesel	3.18	0.70	7.51	0.025	0.63	0.60	799	0.11	0.02	807	839	248
Other Industrial Equipment	Diesel	3.18	0.50	6.30	0.025	0.32	0.31	799	0.11	0.02	807	839	248
Other Industrial Equipment	Diesel	3.18	0.24	4.02	0.025	0.40	0.39	799	0.11	0.02	807	839	248
Other Industrial Equipment	Diesel	4.06	1.50	18.77	0.025	1.34	1.29	799	0.11	0.02	807	839	248
Other Industrial Equipment	Diesel	4.68	1.33	9.25	0.025	0.97	0.93	799	0.11	0.02	807	839	248
Other Industrial Equipment	Diesel	3.18	0.70	7.51	0.025	0.63	0.60	799	0.11	0.02	807	839	248
Other Industrial Equipment	Diesel	3.18	0.50	6.30	0.025	0.32	0.31	799	0.11	0.02	807	839	248
Other Industrial Equipment	Diesel	3.18	0.24	4.02	0.025	0.40	0.39	799	0.11	0.02	807	839	248
Other Industrial Equipment	Diesel	4.06	1.50	18.77	0.022	1.34	1.29	718	0.10	0.02	726	839	223
Other Industrial Equipment	Diesel	3.62	0.91	11.24	0.022	0.54	0.51	718	0.10	0.02	726	839	223
Other Industrial Equipment	Diesel	1.17	0.46	7.58	0.022	0.38	0.36	718	0.10	0.02	726	839	223
Other Industrial Equipment	Diesel	1.17	0.46	5.50	0.022	0.24	0.23	718	0.10	0.02	726	839	223

CHE Type	Fuel	Emission Factor g/Hp-hr unless otherwise stated											
		CO	THC	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	$CO_{2\text{-}e}$	$CO_{2\text{-}eNGA}$	FC
Other Industrial Equipment	Diesel	1.17	0.24	3.35	0.022	0.30	0.28	718	0.10	0.02	726	839	223
Other Industrial Equipment	Diesel	4.06	1.50	18.77	0.022	1.34	1.29	718	0.10	0.02	726	839	223
Other Industrial Equipment	Diesel	3.62	0.91	11.24	0.022	0.54	0.51	718	0.10	0.02	726	839	223
Other Industrial Equipment	Diesel	1.01	0.42	7.48	0.022	0.34	0.32	718	0.10	0.02	726	839	223
Other Industrial Equipment	Diesel	1.01	0.42	5.36	0.022	0.17	0.17	718	0.10	0.02	726	839	223
Other Industrial Equipment	Diesel	1.01	0.24	3.35	0.022	0.20	0.19	718	0.10	0.02	726	839	223
Other Industrial Equipment	Diesel	4.06	1.50	18.77	0.022	1.34	1.29	718	0.10	0.02	726	839	223
Other Industrial Equipment	Diesel	3.62	0.91	11.24	0.022	0.54	0.51	718	0.10	0.02	726	839	223
Other Industrial Equipment	Diesel	1.76	0.27	8.07	0.022	0.27	0.26	718	0.10	0.02	726	839	223
Other Industrial Equipment	Diesel	1.13	0.23	5.82	0.022	0.17	0.17	718	0.10	0.02	726	839	223
Other Industrial Equipment	Diesel	1.13	0.23	3.35	0.022	0.20	0.19	718	0.10	0.02	726	839	223
Other Industrial Equipment	Diesel	4.06	1.50	18.77	0.022	1.34	1.29	718	0.10	0.02	726	839	223
Other Industrial Equipment	Diesel	3.62	0.91	11.24	0.022	0.54	0.51	718	0.10	0.02	726	839	223
Other Industrial Equipment	Diesel	1.78	0.20	7.80	0.022	0.30	0.28	718	0.10	0.02	726	839	223
Other Industrial Equipment	Diesel	1.78	0.23	5.50	0.022	0.17	0.17	718	0.10	0.02	726	839	223
Other Industrial Equipment	Diesel	1.78	0.23	3.35	0.022	0.20	0.19	718	0.10	0.02	726	839	223

CHE Type	Fuel	Emission Factor g/Hp-hr unless otherwise stated											
		CO	THC	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_{2-e}	CO_{2-eNGA}	FC
Other Industrial Equipment	Diesel	4.06	1.50	18.77	0.022	1.34	1.29	718	0.10	0.02	726	839	223
Other Industrial Equipment	Diesel	3.62	0.91	11.24	0.022	0.54	0.51	718	0.10	0.02	726	839	223
Other Industrial Equipment	Diesel	1.02	0.39	8.25	0.022	0.25	0.24	718	0.10	0.02	726	839	223
Other Industrial Equipment	Diesel	1.02	0.23	5.50	0.022	0.17	0.17	718	0.10	0.02	726	839	223
Other Industrial Equipment	Diesel	1.02	0.23	5.50	0.022	0.17	0.17	718	0.10	0.02	726	839	223
Skid-Steer Loader	Diesel	17.23	4.61	15.15	0.029	2.64	2.53	942	0.13	0.02	951.11	839	293
Skid-Steer Loader	Diesel	17.23	4.61	15.15	0.029	2.64	2.53	942	0.13	0.02	951.11	839	293
Skid-Steer Loader	Diesel	14.17	2.35	7.93	0.029	1.18	1.13	942	0.13	0.02	951.11	839	293
Skid-Steer Loader	Diesel	14.17	1.69	6.52	0.029	1.33	1.27	942	0.13	0.02	951.11	839	293
Skid-Steer Loader	Diesel	14.17	1.69	6.52	0.029	1.33	1.27	942	0.13	0.02	951.11	839	293
Skid-Steer Loader	Diesel	17.23	5.23	12.89	0.029	2.39	2.29	942	0.13	0.02	951.11	839	293
Skid-Steer Loader	Diesel	17.23	5.23	12.89	0.029	2.39	2.29	942	0.13	0.02	951.11	839	293
Skid-Steer Loader	Diesel	7.44	1.34	6.73	0.029	0.71	0.68	942	0.13	0.02	951.11	839	293
Skid-Steer Loader	Diesel	7.44	1.34	6.73	0.029	0.71	0.68	942	0.13	0.02	951.11	839	293
Skid-Steer Loader	Diesel	7.44	1.34	6.73	0.029	0.71	0.68	942	0.13	0.02	951.11	839	293
Skid-Steer Loader	Diesel	17.23	5.23	12.89	0.029	2.39	2.29	942	0.13	0.02	951.11	839	293

CHE Type	Fuel	Emission Factor g/Hp-hr unless otherwise stated											
		CO	THC	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_{2-e}	CO_{2-eNGA}	FC
Skid-Steer Loader	Diesel	17.23	5.23	12.89	0.029	2.39	2.29	942	0.13	0.02	951.11	839	293
Skid-Steer Loader	Diesel	7.44	1.34	6.73	0.029	0.71	0.68	942	0.13	0.02	951.11	839	293
Skid-Steer Loader	Diesel	7.44	1.34	6.73	0.029	0.71	0.68	942	0.13	0.02	951.11	839	293
Skid-Steer Loader	Diesel	7.44	1.34	6.73	0.029	0.71	0.68	942	0.13	0.02	951.11	839	293
Skid-Steer Loader	Diesel	17.23	5.54	10.46	0.029	2.12	2.03	942	0.13	0.02	951.11	839	293
Skid-Steer Loader	Diesel	17.23	5.54	10.46	0.029	2.12	2.03	942	0.13	0.02	951.11	839	293
Skid-Steer Loader	Diesel	5.28	0.86	7.16	0.029	0.90	0.86	942	0.13	0.02	951.11	839	293
Skid-Steer Loader	Diesel	5.28	0.86	7.16	0.029	0.90	0.86	942	0.13	0.02	951.11	839	293
Skid-Steer Loader	Diesel	5.28	0.86	7.16	0.029	0.90	0.86	942	0.13	0.02	951.11	839	293
Skid-Steer Loader	Diesel	15.52	4.61	14.55	0.029	2.39	2.29	942	0.13	0.02	951.11	839	293
Skid-Steer Loader	Diesel	12.03	3.04	10.46	0.029	1.90	1.83	942	0.13	0.02	951.11	839	293
Skid-Steer Loader	Diesel	8.15	1.61	8.49	0.029	1.25	1.20	942	0.13	0.02	951.11	839	293
Skid-Steer Loader	Diesel	8.15	1.13	7.12	0.029	0.63	0.60	942	0.13	0.02	951.11	839	293
Skid-Steer Loader	Diesel	8.15	0.56	5.00	0.029	0.95	0.91	942	0.13	0.02	951.11	839	293
Skid-Steer Loader	Diesel	15.52	4.61	14.55	0.029	2.39	2.29	942	0.13	0.02	951.11	839	293
Skid-Steer Loader	Diesel	12.03	3.04	10.46	0.029	1.90	1.83	942	0.13	0.02	951.11	839	293

CHE Type	Fuel	Emission Factor g/Hp-hr unless otherwise stated											
		CO	THC	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_{2-e}	CO_{2-eNGA}	FC
Skid-Steer Loader	Diesel	8.15	1.61	8.49	0.029	1.25	1.20	942	0.13	0.02	951.11	839	293
Skid-Steer Loader	Diesel	8.15	1.13	7.12	0.029	0.63	0.60	942	0.13	0.02	951.11	839	293
Skid-Steer Loader	Diesel	8.15	0.56	5.00	0.029	0.95	0.91	942	0.13	0.02	951.11	839	293
Skid-Steer Loader	Diesel	15.52	4.61	14.55	0.026	2.39	2.29	848	0.12	0.02	856.20	839	263
Skid-Steer Loader	Diesel	9.31	2.09	12.70	0.026	1.06	1.02	848	0.12	0.02	856.20	839	263
Skid-Steer Loader	Diesel	2.99	1.05	8.57	0.026	0.74	0.71	848	0.12	0.02	856.20	839	263
Skid-Steer Loader	Diesel	2.99	1.05	6.21	0.026	0.48	0.46	848	0.12	0.02	856.20	839	263
Skid-Steer Loader	Diesel	2.99	0.56	4.17	0.026	0.70	0.67	848	0.12	0.02	856.20	839	263
Skid-Steer Loader	Diesel	15.52	4.61	14.55	0.026	2.39	2.29	848	0.12	0.02	856.20	839	263
Skid-Steer Loader	Diesel	9.31	2.09	12.70	0.026	1.06	1.02	848	0.12	0.02	856.20	839	263
Skid-Steer Loader	Diesel	2.57	0.95	8.45	0.026	0.67	0.64	848	0.12	0.02	856.20	839	263
Skid-Steer Loader	Diesel	2.57	0.95	6.06	0.026	0.35	0.33	848	0.12	0.02	856.20	839	263
Skid-Steer Loader	Diesel	2.57	0.56	4.17	0.026	0.48	0.46	848	0.12	0.02	856.20	839	263
Skid-Steer Loader	Diesel	15.52	4.61	14.55	0.026	2.39	2.29	848	0.12	0.02	856.20	839	263
Skid-Steer Loader	Diesel	9.31	2.09	12.70	0.026	1.06	1.02	848	0.12	0.02	856.20	839	263
Skid-Steer Loader	Diesel	4.51	0.62	9.12	0.026	0.54	0.51	848	0.12	0.02	856.20	839	263

CHE Type	Fuel	Emission Factor g/Hp-hr unless otherwise stated											
		CO	THC	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	$CO_{2\text{-}e}$	$CO_{2\text{-}eNGA}$	FC
Skid-Steer Loader	Diesel	2.91	0.51	6.57	0.026	0.35	0.33	848	0.12	0.02	856.20	839	263
Skid-Steer Loader	Diesel	2.91	0.51	4.17	0.026	0.48	0.46	848	0.12	0.02	856.20	839	263
Skid-Steer Loader	Diesel	15.52	4.61	14.55	0.026	2.39	2.29	848	0.12	0.02	856.20	839	263
Skid-Steer Loader	Diesel	9.31	2.09	12.70	0.026	1.06	1.02	848	0.12	0.02	856.20	839	263
Skid-Steer Loader	Diesel	4.57	0.46	8.82	0.026	0.58	0.55	848	0.12	0.02	856.20	839	263
Skid-Steer Loader	Diesel	4.57	0.51	6.21	0.026	0.35	0.33	848	0.12	0.02	856.20	839	263
Skid-Steer Loader	Diesel	4.57	0.51	4.17	0.026	0.48	0.46	848	0.12	0.02	856.20	839	263
Skid-Steer Loader	Diesel	15.52	4.61	14.55	0.026	2.39	2.29	848	0.12	0.02	856.20	839	263
Skid-Steer Loader	Diesel	9.31	2.09	12.70	0.026	1.06	1.02	848	0.12	0.02	856.20	839	263
Skid-Steer Loader	Diesel	2.63	0.89	9.32	0.026	0.51	0.49	848	0.12	0.02	856.20	839	263
Skid-Steer Loader	Diesel	2.63	0.51	6.21	0.026	0.35	0.33	848	0.12	0.02	856.20	839	263
Skid-Steer Loader	Diesel	2.63	0.51	6.21	0.026	0.35	0.33	848	0.12	0.02	856.20	839	263
Other Material Handling Equipment	Diesel	17.23	4.61	15.15	0.029	2.64	2.53	942	0.13	0.02	951.11	839	293
Other Material Handling Equipment	Diesel	17.23	4.61	15.15	0.029	2.64	2.53	942	0.13	0.02	951.11	839	293
Other Material Handling Equipment	Diesel	14.17	2.35	7.93	0.029	1.18	1.13	942	0.13	0.02	951.11	839	293

CHE Type	Fuel	Emission Factor g/Hp-hr unless otherwise stated											
		CO	THC	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_{2-e}	CO_{2-eNGA}	FC
Other Material Handling Equipment	Diesel	14.17	1.69	6.52	0.029	1.33	1.27	942	0.13	0.02	951.11	839	293
Other Material Handling Equipment	Diesel	14.17	1.69	6.52	0.029	1.33	1.27	942	0.13	0.02	951.11	839	293
Other Material Handling Equipment	Diesel	17.23	5.23	12.89	0.029	2.39	2.29	942	0.13	0.02	951.11	839	293
Other Material Handling Equipment	Diesel	17.23	5.23	12.89	0.029	2.39	2.29	942	0.13	0.02	951.11	839	293
Other Material Handling Equipment	Diesel	7.44	1.34	6.73	0.029	0.71	0.68	942	0.13	0.02	951.11	839	293
Other Material Handling Equipment	Diesel	7.44	1.34	6.73	0.029	0.71	0.68	942	0.13	0.02	951.11	839	293
Other Material Handling Equipment	Diesel	7.44	1.34	6.73	0.029	0.71	0.68	942	0.13	0.02	951.11	839	293
Other Material Handling Equipment	Diesel	17.23	5.23	12.89	0.029	2.39	2.29	942	0.13	0.02	951.11	839	293
Other Material Handling Equipment	Diesel	17.23	5.23	12.89	0.029	2.39	2.29	942	0.13	0.02	951.11	839	293
Other Material Handling Equipment	Diesel	7.44	1.34	6.73	0.029	0.71	0.68	942	0.13	0.02	951.11	839	293
Other Material Handling Equipment	Diesel	7.44	1.34	6.73	0.029	0.71	0.68	942	0.13	0.02	951.11	839	293

CHE Type	Fuel	Emission Factor g/Hp-hr unless otherwise stated											
		CO	THC	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_{2-e}	CO_{2-eNGA}	FC
Other Material Handling Equipment	Diesel	7.44	1.34	6.73	0.029	0.71	0.68	942	0.13	0.02	951.11	839	293
Other Material Handling Equipment	Diesel	17.23	5.54	10.46	0.029	2.12	2.03	942	0.13	0.02	951.11	839	293
Other Material Handling Equipment	Diesel	17.23	5.54	10.46	0.029	2.12	2.03	942	0.13	0.02	951.11	839	293
Other Material Handling Equipment	Diesel	5.28	0.86	7.16	0.029	0.90	0.86	942	0.13	0.02	951.11	839	293
Other Material Handling Equipment	Diesel	5.28	0.86	7.16	0.029	0.90	0.86	942	0.13	0.02	951.11	839	293
Other Material Handling Equipment	Diesel	5.28	0.86	7.16	0.029	0.90	0.86	942	0.13	0.02	951.11	839	293
Other Material Handling Equipment	Diesel	10.45	3.45	21.21	0.029	2.64	2.53	942	0.13	0.02	951.11	839	293
Other Material Handling Equipment	Diesel	12.03	3.04	10.46	0.029	1.90	1.83	942	0.13	0.02	951.11	839	293
Other Material Handling Equipment	Diesel	8.15	1.61	8.49	0.029	1.25	1.20	942	0.13	0.02	951.11	839	293
Other Material Handling Equipment	Diesel	8.15	1.13	7.12	0.029	0.63	0.60	942	0.13	0.02	951.11	839	293
Other Material Handling Equipment	Diesel	8.15	0.56	5.00	0.029	0.95	0.91	942	0.13	0.02	951.11	839	293

CHE Type	Fuel	Emission Factor g/Hp-hr unless otherwise stated											
		CO	THC	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_{2-e}	CO_{2-eNGA}	FC
Other Material Handling Equipment	Diesel	10.45	3.45	21.21	0.029	2.64	2.53	942	0.13	0.02	951.11	839	293
Other Material Handling Equipment	Diesel	12.03	3.04	10.46	0.029	1.90	1.83	942	0.13	0.02	951.11	839	293
Other Material Handling Equipment	Diesel	8.15	1.61	8.49	0.029	1.25	1.20	942	0.13	0.02	951.11	839	293
Other Material Handling Equipment	Diesel	8.15	1.13	7.12	0.029	0.63	0.60	942	0.13	0.02	951.11	839	293
Other Material Handling Equipment	Diesel	8.15	0.56	5.00	0.029	0.95	0.91	942	0.13	0.02	951.11	839	293
Other Material Handling Equipment	Diesel	10.45	3.45	21.21	0.026	2.64	2.53	848	0.12	0.02	856.20	839	263
Other Material Handling Equipment	Diesel	9.31	2.09	12.70	0.026	1.06	1.02	848	0.12	0.02	856.20	839	263
Other Material Handling Equipment	Diesel	2.99	1.05	8.57	0.026	0.74	0.71	848	0.12	0.02	856.20	839	263
Other Material Handling Equipment	Diesel	2.99	1.05	6.21	0.026	0.48	0.46	848	0.12	0.02	856.20	839	263
Other Material Handling Equipment	Diesel	2.99	0.56	4.17	0.026	0.70	0.67	848	0.12	0.02	856.20	839	263
Other Material Handling Equipment	Diesel	10.45	3.45	21.21	0.026	2.64	2.53	848	0.12	0.02	856.20	839	263

CHE Type	Fuel	Emission Factor g/Hp-hr unless otherwise stated											
		CO	THC	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_{2-e}	CO_{2-eNGA}	FC
Other Material Handling Equipment	Diesel	9.31	2.09	12.70	0.026	1.06	1.02	848	0.12	0.02	856.20	839	263
Other Material Handling Equipment	Diesel	2.57	0.95	8.45	0.026	0.67	0.64	848	0.12	0.02	856.20	839	263
Other Material Handling Equipment	Diesel	2.57	0.95	6.06	0.026	0.35	0.33	848	0.12	0.02	856.20	839	263
Other Material Handling Equipment	Diesel	2.57	0.56	4.17	0.026	0.48	0.46	848	0.12	0.02	856.20	839	263
Other Material Handling Equipment	Diesel	10.45	3.45	21.21	0.026	2.64	2.53	848	0.12	0.02	856.20	839	263
Other Material Handling Equipment	Diesel	9.31	2.09	12.70	0.026	1.06	1.02	848	0.12	0.02	856.20	839	263
Other Material Handling Equipment	Diesel	4.51	0.62	9.12	0.026	0.54	0.51	848	0.12	0.02	856.20	839	263
Other Material Handling Equipment	Diesel	2.91	0.51	6.57	0.026	0.35	0.33	848	0.12	0.02	856.20	839	263
Other Material Handling Equipment	Diesel	2.91	0.51	4.17	0.026	0.48	0.46	848	0.12	0.02	856.20	839	263
Other Material Handling Equipment	Diesel	10.45	3.45	21.21	0.026	2.64	2.53	848	0.12	0.02	856.20	839	263
Other Material Handling Equipment	Diesel	9.31	2.09	12.70	0.026	1.06	1.02	848	0.12	0.02	856.20	839	263

CHE Type	Fuel	Emission Factor g/Hp-hr unless otherwise stated											
		CO	THC	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_{2-e}	CO_{2-eNGA}	FC
Other Material Handling Equipment	Diesel	4.57	0.46	8.82	0.026	0.58	0.55	848	0.12	0.02	856.20	839	263
Other Material Handling Equipment	Diesel	4.57	0.51	6.21	0.026	0.35	0.33	848	0.12	0.02	856.20	839	263
Other Material Handling Equipment	Diesel	4.57	0.51	4.17	0.026	0.48	0.46	848	0.12	0.02	856.20	839	263
Other Material Handling Equipment	Diesel	10.45	3.45	21.21	0.026	2.64	2.53	848	0.12	0.02	856.20	839	263
Other Material Handling Equipment	Diesel	9.31	2.09	12.70	0.026	1.06	1.02	848	0.12	0.02	856.20	839	263
Other Material Handling Equipment	Diesel	2.63	0.89	9.32	0.026	0.51	0.49	848	0.12	0.02	856.20	839	263
Other Material Handling Equipment	Diesel	2.63	0.51	6.21	0.026	0.35	0.33	848	0.12	0.02	856.20	839	263
Other Material Handling Equipment	Diesel	2.63	0.51	6.21	0.026	0.35	0.33	848	0.12	0.02	856.20	839	263
Terminal Tractor	Diesel	10.26	2.11	12.87	0.025	1.65	1.58	807	0.11	0.02	814.67	839	251
Terminal Tractor	Diesel	10.26	2.11	12.87	0.025	1.65	1.58	807	0.11	0.02	814.67	839	251
Terminal Tractor	Diesel	8.44	1.07	6.73	0.025	0.74	0.71	807	0.11	0.02	814.67	839	251
Terminal Tractor	Diesel	8.44	0.78	5.54	0.025	0.82	0.78	807	0.11	0.02	814.67	839	251
Terminal Tractor	Diesel	8.44	0.78	5.54	0.025	0.82	0.78	807	0.11	0.02	814.67	839	251
Terminal Tractor	Diesel	10.26	2.39	10.94	0.025	1.48	1.41	807	0.11	0.02	814.67	839	251
Terminal Tractor	Diesel	10.26	2.39	10.94	0.025	1.48	1.41	807	0.11	0.02	814.67	839	251
Terminal Tractor	Diesel	4.44	0.62	5.71	0.025	0.44	0.42	807	0.11	0.02	814.67	839	251
Terminal Tractor	Diesel	4.44	0.62	5.71	0.025	0.44	0.42	807	0.11	0.02	814.67	839	251

CHE Type	Fuel	Emission Factor g/Hp-hr unless otherwise stated											
		CO	THC	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	$CO_{2\text{-}e}$	$CO_{2\text{-}eNGA}$	FC
Terminal Tractor	Diesel	4.44	0.62	5.71	0.025	0.44	0.42	807	0.11	0.02	814.67	839	251
Terminal Tractor	Diesel	10.26	2.39	10.94	0.025	1.48	1.41	807	0.11	0.02	814.67	839	251
Terminal Tractor	Diesel	10.26	2.39	10.94	0.025	1.48	1.41	807	0.11	0.02	814.67	839	251
Terminal Tractor	Diesel	4.44	0.62	5.71	0.025	0.44	0.42	807	0.11	0.02	814.67	839	251
Terminal Tractor	Diesel	4.44	0.62	5.71	0.025	0.44	0.42	807	0.11	0.02	814.67	839	251
Terminal Tractor	Diesel	4.44	0.62	5.71	0.025	0.44	0.42	807	0.11	0.02	814.67	839	251
Terminal Tractor	Diesel	10.26	2.52	8.88	0.025	1.31	1.26	807	0.11	0.02	814.67	839	251
Terminal Tractor	Diesel	10.26	2.52	8.88	0.025	1.31	1.26	807	0.11	0.02	814.67	839	251
Terminal Tractor	Diesel	3.14	0.39	6.09	0.025	0.56	0.54	807	0.11	0.02	814.67	839	251
Terminal Tractor	Diesel	3.14	0.39	6.09	0.025	0.56	0.54	807	0.11	0.02	814.67	839	251
Terminal Tractor	Diesel	3.14	0.39	6.09	0.025	0.56	0.54	807	0.11	0.02	814.67	839	251
Terminal Tractor	Diesel	6.22	1.57	18.02	0.025	1.65	1.58	807	0.11	0.02	814.67	839	251
Terminal Tractor	Diesel	7.16	1.38	8.88	0.025	1.19	1.14	807	0.11	0.02	814.67	839	251
Terminal Tractor	Diesel	4.85	0.72	7.20	0.025	0.78	0.75	807	0.11	0.02	814.67	839	251
Terminal Tractor	Diesel	4.85	0.51	6.05	0.025	0.39	0.37	807	0.11	0.02	814.67	839	251
Terminal Tractor	Diesel	4.85	0.25	4.25	0.025	0.59	0.57	807	0.11	0.02	814.67	839	251
Terminal Tractor	Diesel	6.22	1.57	18.02	0.025	1.65	1.58	807	0.11	0.02	814.67	839	251
Terminal Tractor	Diesel	7.16	1.38	8.88	0.025	1.19	1.14	807	0.11	0.02	814.67	839	251
Terminal Tractor	Diesel	4.85	0.72	7.20	0.025	0.78	0.75	807	0.11	0.02	814.67	839	251
Terminal Tractor	Diesel	4.85	0.51	6.05	0.025	0.39	0.37	807	0.11	0.02	814.67	839	251
Terminal Tractor	Diesel	4.85	0.25	4.25	0.025	0.59	0.57	807	0.11	0.02	814.67	839	251
Terminal Tractor	Diesel	6.22	1.57	18.02	0.023	1.65	1.58	726	0.10	0.02	733.60	839	226
Terminal Tractor	Diesel	5.54	0.95	10.78	0.023	0.66	0.63	726	0.10	0.02	733.60	839	226
Terminal Tractor	Diesel	1.78	0.47	7.28	0.023	0.46	0.44	726	0.10	0.02	733.60	839	226
Terminal Tractor	Diesel	1.78	0.47	5.28	0.023	0.30	0.28	726	0.10	0.02	733.60	839	226
Terminal Tractor	Diesel	1.78	0.25	3.54	0.023	0.43	0.41	726	0.10	0.02	733.60	839	226
Terminal Tractor	Diesel	6.22	1.57	18.02	0.023	1.65	1.58	726	0.10	0.02	733.60	839	226
Terminal Tractor	Diesel	5.54	0.95	10.78	0.023	0.66	0.63	726	0.10	0.02	733.60	839	226
Terminal Tractor	Diesel	1.53	0.43	7.17	0.023	0.42	0.40	726	0.10	0.02	733.60	839	226
Terminal Tractor	Diesel	1.53	0.43	5.15	0.023	0.21	0.21	726	0.10	0.02	733.60	839	226
Terminal Tractor	Diesel	1.53	0.25	3.54	0.023	0.30	0.28	726	0.10	0.02	733.60	839	226
Terminal Tractor	Diesel	6.22	1.57	18.02	0.023	1.65	1.58	726	0.10	0.02	733.60	839	226
Terminal Tractor	Diesel	5.54	0.95	10.78	0.023	0.66	0.63	726	0.10	0.02	733.60	839	226

CHE Type	Fuel	Emission Factor g/Hp-hr unless otherwise stated											
		CO	THC	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	$CO_{2\text{-}e}$	$CO_{2\text{-}eNGA}$	FC
Terminal Tractor	Diesel	2.68	0.28	7.74	0.023	0.34	0.32	726	0.10	0.02	733.60	839	226
Terminal Tractor	Diesel	1.73	0.23	5.58	0.023	0.21	0.21	726	0.10	0.02	733.60	839	226
Terminal Tractor	Diesel	1.73	0.23	3.54	0.023	0.30	0.28	726	0.10	0.02	733.60	839	226
Terminal Tractor	Diesel	6.22	1.57	18.02	0.023	1.65	1.58	726	0.10	0.02	733.60	839	226
Terminal Tractor	Diesel	5.54	0.95	10.78	0.023	0.66	0.63	726	0.10	0.02	733.60	839	226
Terminal Tractor	Diesel	2.72	0.20	7.50	0.023	0.36	0.35	726	0.10	0.02	733.60	839	226
Terminal Tractor	Diesel	2.72	0.23	5.28	0.023	0.21	0.21	726	0.10	0.02	733.60	839	226
Terminal Tractor	Diesel	2.72	0.23	3.54	0.023	0.30	0.28	726	0.10	0.02	733.60	839	226
Terminal Tractor	Diesel	6.22	1.57	18.02	0.023	1.65	1.58	726	0.10	0.02	733.60	839	226
Terminal Tractor	Diesel	5.54	0.95	10.78	0.023	0.66	0.63	726	0.10	0.02	733.60	839	226
Terminal Tractor	Diesel	1.57	0.40	7.93	0.023	0.32	0.31	726	0.10	0.02	733.60	839	226
Terminal Tractor	Diesel	1.57	0.23	5.28	0.023	0.21	0.21	726	0.10	0.02	733.60	839	226
Terminal Tractor	Diesel	1.57	0.23	5.28	0.023	0.21	0.21	726	0.10	0.02	733.60	839	226
Light Commercial Generator Set	Diesel	6.71	2.01	13.41	0.025	1.34	1.29	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	6.71	2.01	13.41	0.025	1.34	1.29	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	5.51	1.02	7.01	0.025	0.60	0.58	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	5.51	0.74	5.77	0.025	0.67	0.64	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	5.51	0.74	5.77	0.025	0.67	0.64	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	6.71	2.28	11.40	0.025	1.21	1.16	816	0.11	0.02	824.72	839	254

CHE Type	Fuel	Emission Factor g/Hp-hr unless otherwise stated											
		CO	THC	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_{2-e}	CO_{2-eNGA}	FC
Light Commercial Generator Set	Diesel	6.71	2.28	11.40	0.025	1.21	1.16	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	2.90	0.59	5.95	0.025	0.36	0.35	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	2.90	0.59	5.95	0.025	0.36	0.35	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	2.90	0.59	5.95	0.025	0.36	0.35	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	6.71	2.28	11.40	0.025	1.21	1.16	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	6.71	2.28	11.40	0.025	1.21	1.16	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	2.90	0.59	5.95	0.025	0.36	0.35	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	2.90	0.59	5.95	0.025	0.36	0.35	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	2.90	0.59	5.95	0.025	0.36	0.35	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	6.71	2.41	9.25	0.025	1.07	1.03	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	6.71	2.41	9.25	0.025	1.07	1.03	816	0.11	0.02	824.72	839	254

CHE Type	Fuel	Emission Factor g/Hp-hr unless otherwise stated											
		CO	THC	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_{2-e}	CO_{2-eNGA}	FC
Light Commercial Generator Set	Diesel	2.05	0.38	6.34	0.025	0.46	0.44	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	2.05	0.38	6.34	0.025	0.46	0.44	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	2.05	0.38	6.34	0.025	0.46	0.44	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	6.71	1.61	10.73	0.025	1.34	1.29	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	4.68	1.33	9.25	0.025	0.97	0.93	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	3.18	0.70	7.51	0.025	0.63	0.60	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	3.18	0.50	6.30	0.025	0.32	0.31	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	3.18	0.24	4.02	0.025	0.40	0.39	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	6.71	1.61	10.73	0.025	1.34	1.29	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	4.68	1.33	9.25	0.025	0.97	0.93	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	3.18	0.70	7.51	0.025	0.63	0.60	816	0.11	0.02	824.72	839	254

CHE Type	Fuel	Emission Factor g/Hp-hr unless otherwise stated											
		CO	THC	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_{2-e}	CO_{2-eNGA}	FC
Light Commercial Generator Set	Diesel	3.18	0.50	6.30	0.025	0.32	0.31	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	3.18	0.24	4.02	0.025	0.40	0.39	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	6.71	1.61	10.73	0.025	1.34	1.29	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	3.62	0.91	11.24	0.025	0.54	0.51	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	1.17	0.46	7.58	0.025	0.38	0.36	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	1.17	0.46	5.50	0.025	0.24	0.23	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	1.17	0.24	3.35	0.025	0.30	0.28	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	6.71	1.61	10.73	0.025	1.34	1.29	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	3.62	0.91	11.24	0.025	0.54	0.51	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	1.01	0.42	7.48	0.025	0.34	0.32	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	1.01	0.42	5.36	0.025	0.17	0.17	816	0.11	0.02	824.72	839	254

CHE Type	Fuel	Emission Factor g/Hp-hr unless otherwise stated											
		CO	THC	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_{2-e}	CO_{2-eNGA}	FC
Light Commercial Generator Set	Diesel	1.01	0.24	3.35	0.025	0.20	0.19	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	6.71	1.61	10.73	0.025	1.34	1.29	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	3.62	0.91	11.24	0.025	0.54	0.51	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	1.76	0.27	8.07	0.025	0.27	0.26	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	1.13	0.23	5.82	0.025	0.17	0.17	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	1.13	0.23	3.35	0.025	0.20	0.19	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	6.71	1.61	10.73	0.025	1.34	1.29	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	3.62	0.91	11.24	0.025	0.54	0.51	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	1.78	0.20	7.80	0.025	0.30	0.28	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	1.78	0.23	5.50	0.025	0.17	0.17	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	1.78	0.23	3.35	0.025	0.20	0.19	816	0.11	0.02	824.72	839	254

CHE Type	Fuel	Emission Factor g/Hp-hr unless otherwise stated											
		CO	THC	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_{2-e}	CO_{2-eNGA}	FC
Light Commercial Generator Set	Diesel	6.71	1.61	10.73	0.025	1.34	1.29	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	3.62	0.91	11.24	0.025	0.54	0.51	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	1.02	0.39	8.25	0.025	0.25	0.24	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	1.02	0.23	5.50	0.025	0.17	0.17	816	0.11	0.02	824.72	839	254
Light Commercial Generator Set	Diesel	1.02	0.23	5.50	0.025	0.17	0.17	816	0.11	0.02	824.72	839	254

APPENDIX F

Determination of Traffic Composition at the WIM Site

In order to examine the fleet composition in the Port area, we have analysed two datasets that were provided by the Department of Transport and Main Roads (DTMR):

- license plate numbers by date/time of day recorded with a camera at the WIM facility; and
- vehicle registration details for the recorded license plate numbers.

The camera recorded a sample of about 90% of outbound traffic and provide information on date, time and license registration. Analysis of the **camera data** showed that 14,637 license plate numbers were recorded for the period of 27 April 09 2:23 PM to 1 May 09 11:57 PM. A total of 6,458 unique license plates were recorded, which shows that a number of vehicles regularly visit the port area.

DTMR mentioned that the camera was experiencing some issues and did not record the entire time. Recordings were made 53% of the time during the 5 day period. Nevertheless, the data are superior when compared to average Brisbane fleet composition data that are available from the Australian Bureau of Statistics because it reflects the local traffic composition.

The **vehicle registration** data were extracted from the Queensland Transport (QT) Transport Registration And Integrated Licensing System (TRAILS). The data in TRAILS has been collected from a variety of sources including Queensland Police, Dealer Services, Insurance Companies and QGap Offices. For each unique license plate number, the following information was provided:

- vehicle make and model;
- vehicle registration category;
- fuel type;
- year of manufacture;
- tare weight (unladen weight);
- GVM; and
- GCM.

The vehicle registration data were combined with the camera data using license registration as vehicle identifier. Analysis of the new camera-registration database showed that 53% of the unique license plates belong to light-duty vehicles (cars, light-commercial vehicles, motor homes) and 8% are vehicles with unidentifiable registration numbers. The latter are vehicles with interstate registration numbers, license plates that are not attached to the vehicles or vehicles with cancelled registrations. A minor portion of the data shows buses (0.5%) and special vehicles (0.2%, e.g. mobile machinery). Trucks make up 38% of the recorded license plates, which are classified by DTMR as (rigid) "truck", "prime mover", "B-Double", "B-Triple" or "road train".

Information on GVM/GCM were subsequently used to classify the fleet according to Table 4.1 (truck classification). A cross-comparison between the two classification methods is shown in Table 12.2.

Table 12.2: DTMR and GVM/GCM Classification

DTMR Vehicle Class	MCV 3.5-12.0 Tonne	HCV 12.0-25.0 Tonne	ST 25.0-40.0 Tonne	BD 40.0-70.0 Tonne	SBD > 70.0 Tonne	Total
Trucks (Rigid)	7%	14%	3%	_	_	**24%**
Prime Movers	_	0%	1%	27%	12%	**41%**
B-Double	_	_	0%	7%	21%	**28%**
B-Triple	_	_	_	_	1%	**1%**
Road Train	_	_	_	0%	6%	**7%**
Total	**7%**	**14%**	**5%**	**34%**	**40%**	**100%**

As expected, the DTMR truck categories B-Double, B-Triple, Road Train are heavy vehicles with GCM values larger than 40 tonnes. The DTMR (rigid) truck category mainly consists of vehicles with a GVM between 3.5 and 25.0 tonnes, which represent the two rigid truck categories in the emission factor classification (MCV, HCV). A small portion (3%), however, classifies as semi-trailer (ST), and this portion is added to the HCV category as these vehicles are rigid and not semi-trailers. The DTMR category "prime mover" is mainly attributed to the heavy GCM categories (> 40 tonne GCM), which corresponds to the "BD" and "SBD" categories in the vehicle classification. This implies that only 1% of the on-road trucks would classify as a semi-trailer, which is not realistic.

The camera-registration data provide information about how vehicles are registered, but they do not provide information how the vehicles are actually used in practice. For example, a prime mover with a GCM of 90 tonne will be able to operate as a Super-B-Double towing two trailers, but may in practice be used as a conventional semi-trailer towing only one trailer. In that case it should be classified as a semi-trailer (ST) in the vehicle classification, but this information cannot be extracted from the DTMR data alone.

We have therefore combined the DTMR vehicle classification with the GVM/GCM based truck classification (Table 4.1) to determine which cells in Table 12.2. belong to the vehicle classes MCV, HCV, ST, BD and SBD, as is shown in Table 12.3.

Table 12.3: DTMR and GVM/GCM Classification

DTMR Vehicle Class	MCV 3.5-12.0 Tonne	HCV 12.0-25.0 Tonne	ST 25.0-40.0 Tonne	BD 40.0-70.0 Tonne	SBD > 70.0 Tonne
Trucks (Rigid)	MCV	HCV	HCV	_	_
Prime Movers	_	ST	ST	ST	ST
B-Double	_	_	BD	BD	SBD
B-Triple	_	_	_	_	SBD
Road Train	_	_	_	BD	SBD

To verify the adequacy of Table 12.3, **WIM data** were analysed further for the same time period. This dataset is useful as it provides detailed information on vehicle type (i.e. Austroads classification), in-use vehicle mass (weighted separately for each axle group) and vehicle configuration (number of axles by number of axle group, e.g. "1233"). Table 12.4 presents a summary table of these data (27 April - 1 May 2009) according to Austroads vehicle category and vehicle configuration (i.e. number of trailers, number of axle groups and total number of axles). Vehicles were classified according to Table 4.1.

Table 12.4: Summary of WIM Data Truck Classification

Number of Trailers	0	0	0	0	1	1	1	1	1	1
Number of Axle Groups	2	2	2	2	3	3	3	3	3	3
Total Number of Axles	2	3	4	5	3	4	5	6	7	8
Articulated Truck	0	0	0	0	520	822	1542	13807	37	19
B-Double	0	0	0	0	0	0	0	0	0	0
Double Road Train	0	0	0	0	0	0	0	0	0	0
Rigid	2316	1663	274	81	0	0	0	0	0	0
Total	2316	1663	274	81	520	822	1542	13807	37	19

Number of Trailers	2	2	2	2	2	2	2	3	3	
Number of Axle Groups	4	4	4	4	4	4	4	5	5	
Total Number of Axles	4	5	6	7	8	9	10	7	9	Total
Articulated Truck	136	110	967	0	0	0	0	0	0	**17960**
B-Double	0	0	0	2326	148	4313	10	0	0	**6797**
Double Road Train	0	0	0	0	0	0	0	2	16	**18**
Rigid	0	0	0	0	0	0	0	0	0	**4334**
Total	136	110	967	2326	148	4313	10	2	16	**29109**

Table 12.5 shows a comparison of the camera-registration data (Table 12.2 and Table 12.3) and WIM data (Table 12.4) after both datasets have been summarised in terms of the truck classification presented in Table 4.1. It is important to note that different variables were used for each set of data:

- GVM/GCM data and DTMR main vehicle class for the camera-registration data; and
- Austroads vehicle class and vehicle configuration for the WIM data.

Table 12.5 shows significant differences between the two datasets.

Table 12.5: Comparison of DTMR and WIM Data

Emission Factor Truck Class	Camera-Registration Data	WIM Data
MCV	7%	_
HCV	18%	_
Rigid Trucks (MCV + HCV)	24%	15%
Semi-trailers	41%	58%
B-Doubles	7%	23%
Super-B-Doubles (Light)	28%	3%
Super-B-Doubles (Heavy)		0.03%
Double Road Train		0.06%
Undefined	_	0.85%

It appears that the proportion of rigid trucks and super-B-doubles are substantially overestimated when the fleet breakdown is based on the camera-registration data, whereas the proportion of semi-trailers and B-doubles is substantially underestimated. This indicates that the DTMR camera / registration data cannot be used to derive an accurate truck classification. The WIM data breakdown should be used instead.

However, the WIM data do not provide information on fuel type and manufacture, whereas the vehicle registration data do. As there is no direct way of matching the WIM data and the camera/registration data, we have conducted the following steps to create a detailed truck fleet breakdown:

- WIM data are used to estimate proportion of VKT by basic vehicle class (Table 12.5).
- The proportion of MCVs and HCVs in the rigid truck category are estimated by using the relative proportion of these vehicle classes from the camera/registration data (Table 12.2).
- A further breakdown in fuel type and ADR category (year of manufacture) is achieved by analysing the camera/registration data (Table 12.2) for four basic vehicle classes:
  - MCVs (Rigid Trucks ≤ 12 tonne);
  - HCVs (Rigid Trucks > 12 tonne);
  - Semi-trailers (Prime Mover); and
  - B-Double (B-Double, B-Triple, Road Train).
- This breakdown in fuel type and ADR category is then applied to the categories in Table 12.5.

Section 4.2.3 presents the final results of this work.