Technical Report No. 7

Air Emissions Inventory for the Greater Metropolitan Region in New South Wales

Off-Road Mobile Emissions Module: Results

Prepared jointly by

Department of Environment and Climate Change NSW
Optimised Operations Pty Ltd

Acknowledgments

This study was carried out with the assistance of several organisations and individuals who should be recognised for their efforts.

Many thanks to the NSW Environmental Trust and Commonwealth Department of the Environment and Water Resources for providing the Department of Environment and Climate Change NSW (DECC) with funding to complete the study.

The 500 residential households that participated in the domestic survey are gratefully acknowledged. Their input has enabled a thorough evaluation of domestic sources of air emissions.

The 96 commercial businesses and 571 industrial premises that participated in the commercial and industrial surveys respectively, are gratefully acknowledged. Their input has enabled a thorough evaluation of off-road mobile vehicles and equipment air emissions.

The input from fuel suppliers including BP, Caltex, Mobil and Shell is much appreciated.

Information from Newcastle Port Corporation, Pacific National, Port Kembla Port Corporation, Sydney Ferries, Sydney Ports Corporation, and Qantas is gratefully acknowledged.

Data provided by other government departments and service providers including AirServices Australia, Australian Bureau of Agriculture and Resource Economics (ABARE), Australian Bureau of Statistics (ABS), Bureau of Transport and Regional Economics (BTRE), Department of Environment and Conservation NSW (DEC), NSW Department of Primary Industries (DPI), NSW Maritime Authority, Rail Corporation NSW and Transport and Population Data Centre (TPDC) was essential for the completion of this study.

DECC would also like to thank a number of individuals for their efforts in either project scoping/management, developing emission estimation methodologies, collecting activity data, developing databases, estimating emissions and/or preparing this report, including: Mr. Nick Agapides (DECC); Mr. Kelsey Bawden (Pacific Air & Environment Pty Ltd); Mr. William Holzschuh (Optimised Operations Pty Ltd); Mr. Brandon Lee (Optimised Operations Pty Ltd); Mr. Simon Metcalf (Optimised Operations Pty Ltd); Mr. William Thiel (Optimised Operations Pty Ltd); and Mr. Yao Tseng (Optimised Operations Pty Ltd).

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In April 2007 the Department of Environment and Conservation NSW became known as the Department of Environment and Climate Change NSW.

ISBN 978 1 74122 379 8
DECC 2007/11
August 2007

Executive Summary

The Department of Environment and Climate Change NSW (DECC), in collaboration with Optimised Operations (Tseng et. al., 2006), has completed a three year air emissions inventory project for off-road mobile sources. The base year of the off-road mobile inventory represents activities that took place during the 2003 calendar year and is accompanied by emission projections in yearly increments up to the 2031 calendar year. The area included in the study covers greater Sydney, Newcastle and Wollongong regions, known collectively as the Greater Metropolitan Region (GMR).

The study region defined as the GMR measures 210 km (east-west) by 273 km (north-south). The study region is defined in Table ES1.1 and shown in Figure ES1.1.

Table ES1.1: Definition of Greater Metropolitan, Sydney, Newcastle and Wollongong Regions

Region	South-west corner MGA [1] co-ordinates		North-east corner MGA [1] co-ordinates	
	Easting (km)	Northing (km)	Easting (km)	Northing (km)
Greater Metropolitan	210	6159	420	6432
Sydney	261	6201	360	6300
Newcastle	360	6348	408	6372
Wollongong	279	6174	318	6201

[1] MGA = Map Grid of Australia based on the Geocentric Datum of Australia 1994 (GDA94) (ICSM, 2002).

The off-road mobile air emissions inventory includes emissions from the following sources:

- Aircraft;
- Commercial boats;
- Commercial off-road vehicles and equipment;
- Commercial ships;
- Construction off-road vehicles and equipment;
- Industrial off-road vehicles and equipment;
- Loading and unloading petroleum products;
- Railways; and
- Recreational boats.

The pollutants inventoried include criteria pollutants specified in the Air NEPM (NEPC, 2003), air toxics associated with the National Pollutant Inventory (NEPC, 2000) and the Air Toxics NEPM (NEPC, 2004) and any other pollutants associated with state specific programs, i.e. Load Based Licensing (Protection of the Environment Operations (General) Regulation 1998 (PCO, 1998)) and Protection of the Environment Operations (Clean Air) Regulation 2002 (PCO, 2005).

Figure ES1.1: Definition of Greater Metropolitan, Sydney, Newcastle and Wollongong Regions

Table ES1.2 shows total estimated annual emissions (for selected substances) from all off-road mobile sources in the study region (i.e. GMR), Sydney, Newcastle and Wollongong regions. Total estimated annual emissions are also presented for the region defined as Non-Urban. This region is the area of the GMR minus the combined areas of the Sydney, Newcastle and Wollongong regions. These substances have been selected since they are:

- The most common air pollutants found in airsheds according to the National Pollutant Inventory (NEPC, 2000);
- Referred to in National Environment Protection Measures (NEPMs) for criteria pollutants (NEPC, 2003) and air toxics (NEPC, 2004); and
- They have been classified as priority air pollutants (NEPC, 2005).

Table ES1.2: Total estimated annual emissions from off-road mobile sources in each region

Substance	Emissions (tonnes/year)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	$1.60 \times 10^{+01}$	3.15	8.77×10^{-01}	6.78	$2.68 \times 10^{+01}$
ACETALDEHYDE	$1.14 \times 10^{+02}$	$2.29 \times 10^{+01}$	7.83	$1.12 \times 10^{+02}$	$2.57 \times 10^{+02}$
BENZENE	$6.57 \times 10^{+01}$	5.52	3.56	$3.85 \times 10^{+01}$	$1.13 \times 10^{+02}$
CARBON MONOXIDE	$2.03 \times 10^{+04}$	$1.45 \times 10^{+03}$	$7.93 \times 10^{+02}$	$9.65 \times 10^{+03}$	$3.21 \times 10^{+04}$
FORMALDEHYDE	$1.17 \times 10^{+02}$	$2.00 \times 10^{+01}$	5.49	$6.97 \times 10^{+01}$	$2.12 \times 10^{+02}$
ISOMERS OF XYLENE	$2.45 \times 10^{+02}$	$1.56 \times 10^{+01}$	$1.56 \times 10^{+01}$	$1.56 \times 10^{+02}$	$4.32 \times 10^{+02}$
LEAD AND COMPOUNDS	$1.33 \times 10^{+01}$	1.44	1.89	$3.83 \times 10^{+01}$	$5.49 \times 10^{+01}$
OXIDES OF NITROGEN	$9.51 \times 10^{+03}$	$2.95 \times 10^{+03}$	$9.14 \times 10^{+02}$	$1.01 \times 10^{+04}$	$2.35 \times 10^{+04}$
PARTICULATE MATTER < 10 µm	$3.71 \times 10^{+03}$	$4.69 \times 10^{+02}$	$5.08 \times 10^{+02}$	$9.88 \times 10^{+03}$	$1.46 \times 10^{+04}$
PARTICULATE MATTER < 2.5 µm	$1.76 \times 10^{+03}$	$2.53 \times 10^{+02}$	$2.28 \times 10^{+02}$	$4.24 \times 10^{+03}$	$6.49 \times 10^{+03}$
POLYCYCLIC AROMATIC HYDROCARBONS	$2.76 \times 10^{+01}$	1.97	8.65×10^{-01}	9.50	$4.00 \times 10^{+01}$
SULFUR DIOXIDE	$1.37 \times 10^{+03}$	$1.26 \times 10^{+03}$	$2.50 \times 10^{+02}$	$1.28 \times 10^{+03}$	$4.17 \times 10^{+03}$
TETRACHLOROETHYLENE	2.50	1.39×10^{-01}	1.62×10^{-01}	1.47	4.27
TOLUENE	$2.18 \times 10^{+02}$	$1.43 \times 10^{+01}$	$1.34 \times 10^{+01}$	$1.38 \times 10^{+02}$	$3.83 \times 10^{+02}$
TOTAL SUSPENDED PARTICULATES	$1.55 \times 10^{+04}$	$1.77 \times 10^{+03}$	$2.22 \times 10^{+03}$	$4.46 \times 10^{+04}$	$6.41 \times 10^{+04}$
TOTAL VOCS	$4.77 \times 10^{+03}$	$3.12 \times 10^{+02}$	$2.32 \times 10^{+02}$	$2.32 \times 10^{+03}$	$7.64 \times 10^{+03}$
TRICHLOROETHYLENE	1.54	8.51×10^{-02}	9.97×10^{-02}	9.03×10^{-01}	2.62

Figure ES1.2 shows the proportion of total estimated annual emissions (for selected substances) from all off-road mobile sources in the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions.

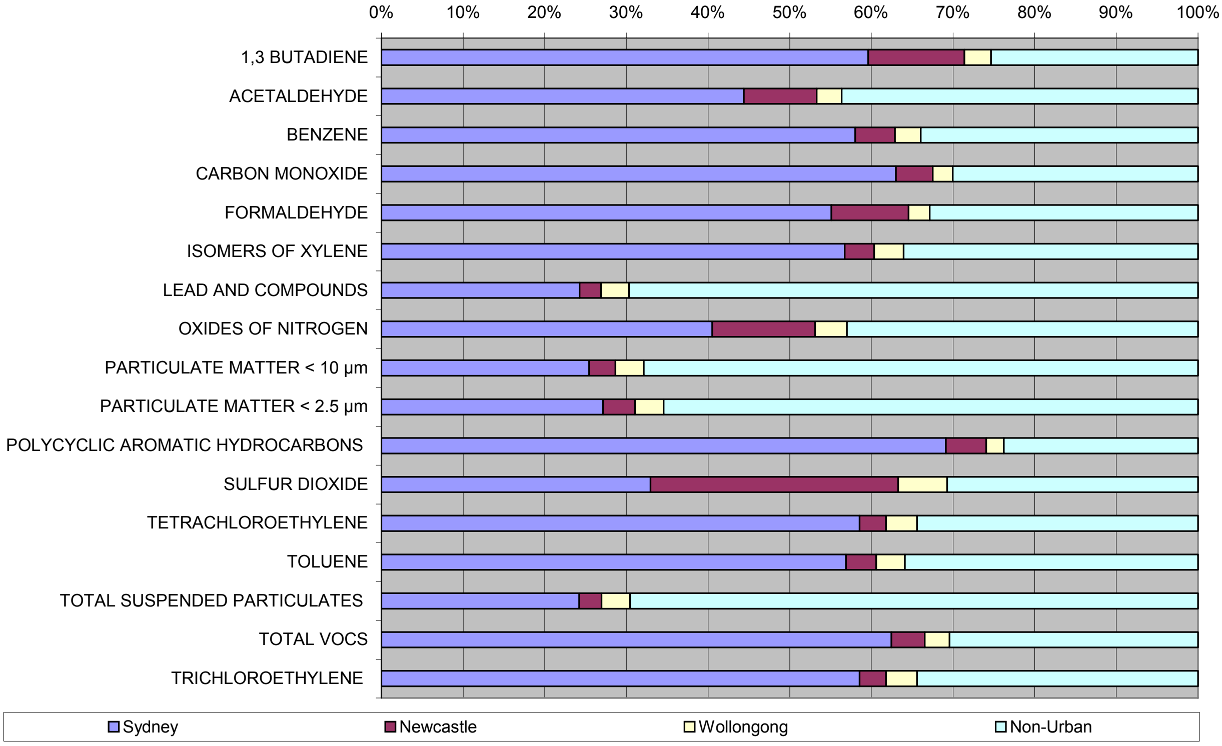

Figure ES1.2: Proportion of total estimated annual emissions from off-road mobile sources in each region

Tables ES1.3, ES1.4, ES1.5, ES1.6 and ES1.7 show total estimated annual emissions (for selected substances) from each off-road mobile source type in the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions respectively.

Figures ES1.3, ES1.4, ES1.5, ES1.6 and ES1.7 show the proportion of total estimated annual emissions (for selected substances) from each off-road mobile source type in the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions respectively.

Table ES1.3: Total estimated annual emissions by off-road mobile source type in the GMR

Substance	Emissions (tonnes/year)									
	Aircraft	Commercial Boats	Commercial Off-Road Vehicles and Equipment	Commercial Ships	Construction Off-Road Vehicles and Equipment	Industrial Off-Road Vehicles and Equipment	Loading and Unloading Fuels	Railways	Recreational Boats	Off-Road Mobile Total
1,3 BUTADIENE	8.29	2.23	2.86×10^{-01}	5.44	1.79×10^{-01}	7.57×10^{-01}	-	2.27	7.31	$2.68 \times 10^{+01}$
ACETALDEHYDE	$6.08 \times 10^{+01}$	$2.92 \times 10^{+01}$	$1.76 \times 10^{+01}$	$3.95 \times 10^{+01}$	3.81	$9.96 \times 10^{+01}$	-	4.28	1.99	$2.57 \times 10^{+02}$
BENZENE	$1.65 \times 10^{+01}$	$2.52 \times 10^{+01}$	1.99×10	3.86	1.72	6.59	3.12	2.49	$5.19 \times 10^{+01}$	$1.13 \times 10^{+02}$
CARBON MONOXIDE	$1.05 \times 10^{+04}$	$5.59 \times 10^{+03}$	$1.21 \times 10^{+03}$	$1.05 \times 10^{+03}$	$7.55 \times 10^{+02}$	$3.00 \times 10^{+03}$	-	$4.25 \times 10^{+02}$	$9.63 \times 10^{+03}$	$3.21 \times 10^{+04}$
FORMALDEHYDE	$8.21 \times 10^{+01}$	$1.72 \times 10^{+01}$	9.71	$3.01 \times 10^{+01}$	2.19	$5.34 \times 10^{+01}$	-	$1.26 \times 10^{+01}$	4.91	$2.12 \times 10^{+02}$
ISOMERS OF XYLENE	$1.37 \times 10^{+01}$	$1.01 \times 10^{+02}$	2.52	2.92	5.77	7.73	2.49	4.03×10^{-01}	$2.96 \times 10^{+02}$	$4.32 \times 10^{+02}$
LEAD AND COMPOUNDS	3.24×10^{-01}	3.26×10^{-03}	4.22	3.97×10^{-03}	2.37×10^{-03}	$5.04 \times 10^{+01}$	-	2.36×10^{-03}	1.70×10^{-04}	$5.49 \times 10^{+01}$
OXIDES OF NITROGEN	$3.27 \times 10^{+03}$	$2.48 \times 10^{+03}$	$1.01 \times 10^{+03}$	$6.18 \times 10^{+03}$	$2.18 \times 10^{+02}$	$6.80 \times 10^{+03}$	-	$3.35 \times 10^{+03}$	$1.72 \times 10^{+02}$	$2.35 \times 10^{+04}$
PARTICULATE MATTER < 10 µm	$9.25 \times 10^{+01}$	$1.67 \times 10^{+02}$	$1.16 \times 10^{+03}$	$2.13 \times 10^{+02}$	$1.71 \times 10^{+01}$	$1.26 \times 10^{+04}$	-	$9.98 \times 10^{+01}$	$2.33 \times 10^{+02}$	$1.46 \times 10^{+04}$
PARTICULATE MATTER < 2.5 µm	$8.58 \times 10^{+01}$	$1.55 \times 10^{+02}$	$5.28 \times 10^{+02}$	$2.04 \times 10^{+02}$	$1.65 \times 10^{+01}$	$5.19 \times 10^{+03}$	-	$9.01 \times 10^{+01}$	$2.14 \times 10^{+02}$	$6.49 \times 10^{+03}$
POLYCYCLIC AROMATIC HYDROCARBONS	$1.86 \times 10^{+01}$	3.28×10	7.17×10^{-01}	1.98×10	2.62×10^{-01}	3.64	-	1.47	$1.01 \times 10^{+01}$	$4.00 \times 10^{+01}$
SULFUR DIOXIDE	$2.40 \times 10^{+02}$	$5.98 \times 10^{+01}$	$3.16 \times 10^{+01}$	$3.15 \times 10^{+03}$	6.68	$1.95 \times 10^{+02}$	-	$4.68 \times 10^{+02}$	$2.14 \times 10^{+01}$	$4.17 \times 10^{+03}$
TETRACHLOROETHYLENE	3.12×10^{-02}	7.38×10^{-01}	1.20×10^{-02}	-	3.93×10^{-02}	9.11×10^{-04}	-	-	3.45	4.27
TOLUENE	$1.74 \times 10^{+01}$	$9.26 \times 10^{+01}$	2.92	3.44	5.40	9.80	7.60	2.52	$2.42 \times 10^{+02}$	$3.83 \times 10^{+02}$
TOTAL SUSPENDED PARTICULATES	$9.74 \times 10^{+01}$	$1.76 \times 10^{+02}$	$4.92 \times 10^{+03}$	$2.25 \times 10^{+02}$	$1.80 \times 10^{+01}$	$5.83 \times 10^{+04}$	-	$1.05 \times 10^{+02}$	$2.45 \times 10^{+02}$	$6.41 \times 10^{+04}$
TOTAL VOCS	$6.66 \times 10^{+02}$	$1.04 \times 10^{+03}$	$1.51 \times 10^{+02}$	$2.30 \times 10^{+02}$	$7.08 \times 10^{+01}$	$5.79 \times 10^{+02}$	$1.13 \times 10^{+03}$	$1.44 \times 10^{+02}$	$3.63 \times 10^{+03}$	$7.64 \times 10^{+03}$
TRICHLOROETHYLENE	1.92×10^{-02}	4.53×10^{-01}	7.37×10^{-03}	-	2.41×10^{-02}	5.59×10^{-04}	-	-	2.12	2.62

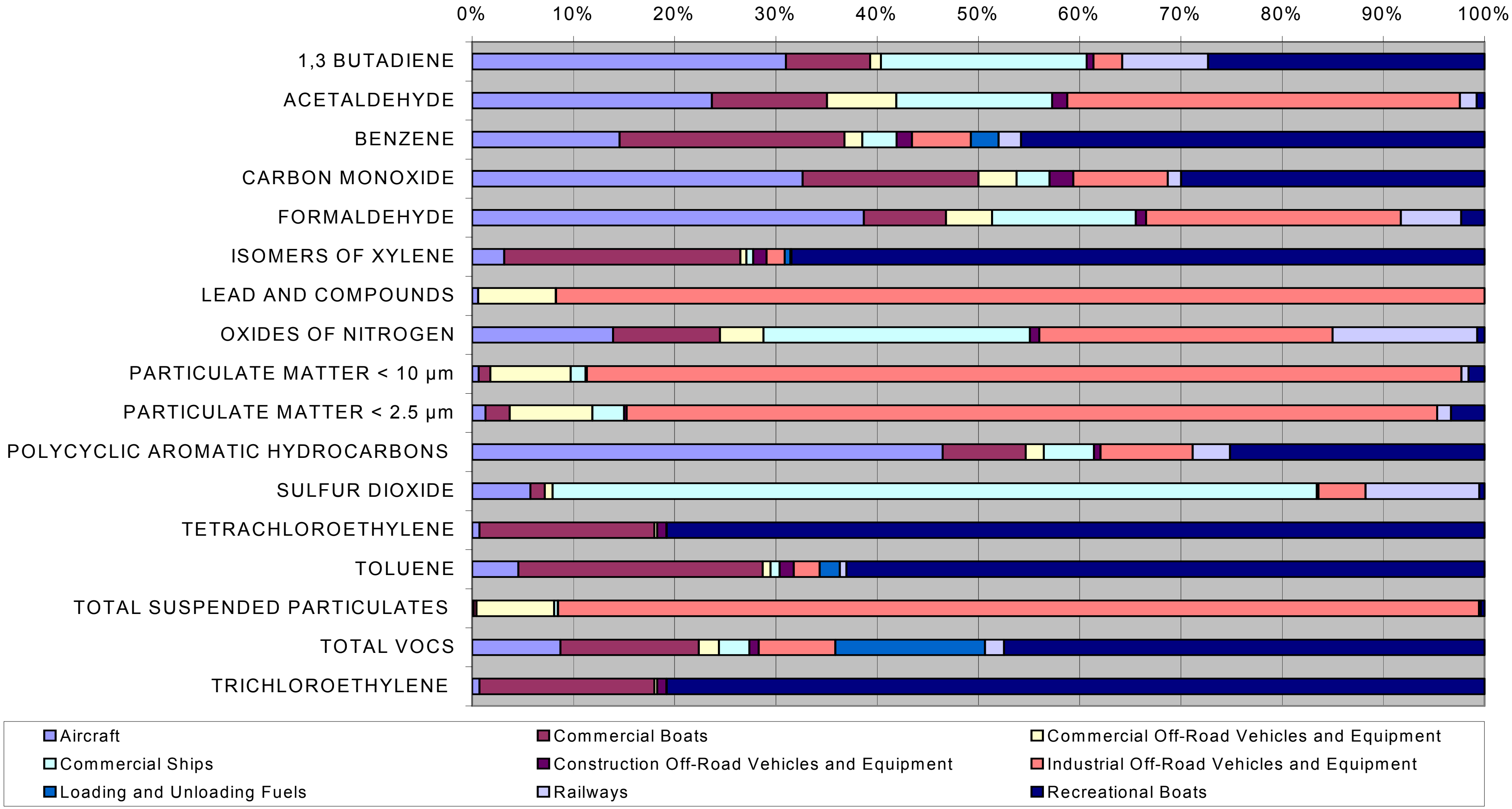

Figure ES1.3: Proportion of total estimated annual emissions by off-road mobile source type in the GMR

Table ES1.4: Total estimated annual emissions by off-road mobile source type in the Sydney region

Substance	Emissions (tonnes/year)									
	Aircraft	Commercial Boats	Commercial Off-Road Vehicles and Equipment	Commercial Ships	Construction Off-Road Vehicles and Equipment	Industrial Off-Road Vehicles and Equipment	Loading and Unloading Fuels	Railways	Recreational Boats	Off-Road Mobile Total
1,3 BUTADIENE	7.63	7.67×10^{-01}	1.25×10^{-01}	1.41	1.40×10^{-01}	1.68×10^{-01}	-	1.09	4.62	$1.60 \times 10^{+01}$
ACETALDEHYDE	$5.76 \times 10^{+01}$	$1.01 \times 10^{+01}$	7.67	$1.03 \times 10^{+01}$	2.98	$2.21 \times 10^{+01}$	-	2.05	1.25	$1.14 \times 10^{+02}$
BENZENE	$1.53 \times 10^{+01}$	8.66	8.68×10^{-01}	1.00	1.34	1.46	3.07	1.20	$3.28 \times 10^{+01}$	$6.57 \times 10^{+01}$
CARBON MONOXIDE	$9.98 \times 10^{+03}$	$1.92 \times 10^{+03}$	$5.26 \times 10^{+02}$	$2.72 \times 10^{+02}$	$5.91 \times 10^{+02}$	$6.66 \times 10^{+02}$	-	$2.04 \times 10^{+02}$	$6.09 \times 10^{+03}$	$2.03 \times 10^{+04}$
FORMALDEHYDE	$7.62 \times 10^{+01}$	5.92	4.23	7.82	1.72	$1.18 \times 10^{+01}$	-	6.07	3.11	$1.17 \times 10^{+02}$
ISOMERS OF XYLENE	$1.28 \times 10^{+01}$	$3.47 \times 10^{+01}$	1.10	7.59×10^{-01}	4.52	1.72	2.45	1.93×10^{-01}	$1.87 \times 10^{+02}$	$2.45 \times 10^{+02}$
LEAD AND COMPOUNDS	3.01×10^{-01}	1.12×10^{-03}	1.84	1.03×10^{-03}	1.86×10^{-03}	$1.12 \times 10^{+01}$	-	1.13×10^{-03}	1.07×10^{-04}	$1.33 \times 10^{+01}$
OXIDES OF NITROGEN	$3.22 \times 10^{+03}$	$8.53 \times 10^{+02}$	$4.40 \times 10^{+02}$	$1.61 \times 10^{+03}$	$1.71 \times 10^{+02}$	$1.51 \times 10^{+03}$	-	$1.61 \times 10^{+03}$	$1.09 \times 10^{+02}$	$9.51 \times 10^{+03}$
PARTICULATE MATTER < 10 µm	$8.62 \times 10^{+01}$	$5.76 \times 10^{+01}$	$5.05 \times 10^{+02}$	$5.55 \times 10^{+01}$	$1.34 \times 10^{+01}$	$2.79 \times 10^{+03}$	-	$4.79 \times 10^{+01}$	$1.47 \times 10^{+02}$	$3.71 \times 10^{+03}$
PARTICULATE MATTER < 2.5 µm	$8.00 \times 10^{+01}$	$5.34 \times 10^{+01}$	$2.30 \times 10^{+02}$	$5.31 \times 10^{+01}$	$1.29 \times 10^{+01}$	$1.15 \times 10^{+03}$	-	$4.33 \times 10^{+01}$	$1.35 \times 10^{+02}$	$1.76 \times 10^{+03}$
POLYCYCLIC AROMATIC HYDROCARBONS	$1.76 \times 10^{+01}$	1.13	3.12×10^{-01}	5.15×10^{-01}	2.05×10^{-01}	8.08×10^{-01}	-	7.08×10^{-01}	6.35×10	$2.76 \times 10^{+01}$
SULFUR DIOXIDE	$2.35 \times 10^{+02}$	$2.06 \times 10^{+01}$	$1.38 \times 10^{+01}$	$8.18 \times 10^{+02}$	5.23	$4.32 \times 10^{+01}$	-	$2.25 \times 10^{+02}$	$1.35 \times 10^{+01}$	$1.37 \times 10^{+03}$
TETRACHLOROETHYLENE	2.99×10^{-02}	2.54×10^{-01}	5.23×10^{-03}	-	3.07×10^{-02}	2.02×10^{-04}	-	-	2.18	2.50
TOLUENE	$1.62 \times 10^{+01}$	$3.19 \times 10^{+01}$	1.28	8.95×10^{-01}	4.23	2.18	7.47	1.21	$1.53 \times 10^{+02}$	$2.18 \times 10^{+02}$
TOTAL SUSPENDED PARTICULATES	$9.08 \times 10^{+01}$	$6.06 \times 10^{+01}$	$2.14 \times 10^{+03}$	$5.84 \times 10^{+01}$	$1.41 \times 10^{+01}$	$1.29 \times 10^{+04}$	-	$5.04 \times 10^{+01}$	$1.55 \times 10^{+02}$	$1.55 \times 10^{+04}$
TOTAL VOCS	$6.21 \times 10^{+02}$	$3.59 \times 10^{+02}$	$6.59 \times 10^{+01}$	$5.98 \times 10^{+01}$	$5.54 \times 10^{+01}$	$1.28 \times 10^{+02}$	$1.12 \times 10^{+03}$	$6.91 \times 10^{+01}$	$2.29 \times 10^{+03}$	$4.77 \times 10^{+03}$
TRICHLOROETHYLENE	1.84×10^{-02}	1.56×10^{-01}	3.21×10^{-03}	-	1.89×10^{-02}	1.24×10^{-04}	-	-	1.34	1.54

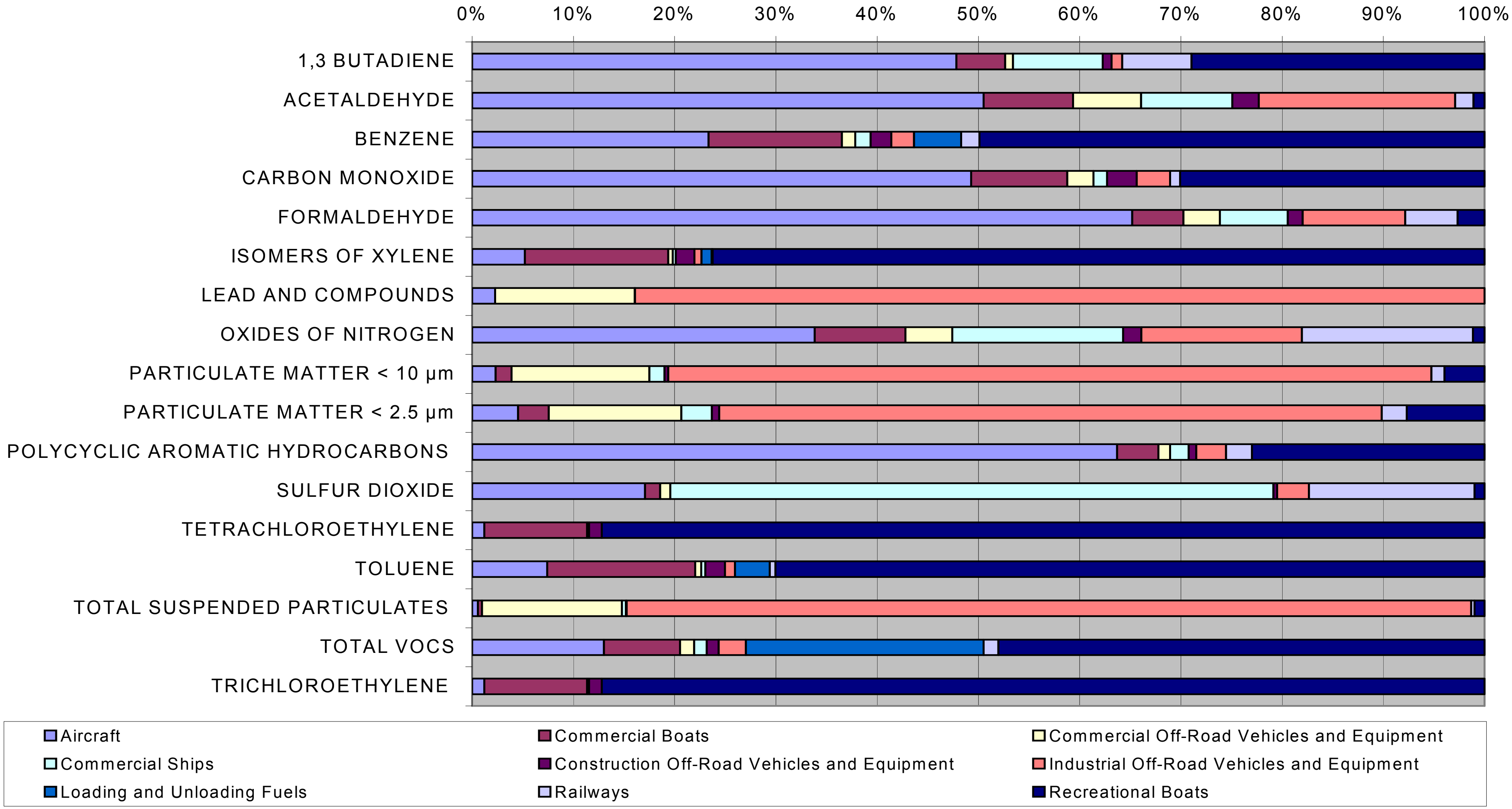

Figure ES1.4: Proportion of total estimated annual emissions by off-road mobile source type in the Sydney region

Table ES1.5: Total estimated annual emissions by off-road mobile source type in the Newcastle region

Substance	Emissions (tonnes/year)									
	Aircraft	Commercial Boats	Commercial Off-Road Vehicles and Equipment	Commercial Ships	Construction Off-Road Vehicles and Equipment	Industrial Off-Road Vehicles and Equipment	Loading and Unloading Fuels	Railways	Recreational Boats	Off-Road Mobile Total
1,3 BUTADIENE	5.55×10^{-01}	9.37×10^{-02}	1.49×10^{-02}	2.12	1.04×10^{-02}	1.82×10^{-02}	-	1.14×10^{-01}	2.20×10^{-01}	3.15
ACETALDEHYDE	2.46	1.23	9.15×10^{-01}	$1.54 \times 10^{+01}$	2.21×10^{-01}	2.39	-	2.14×10^{-01}	5.97×10^{-02}	$2.29 \times 10^{+01}$
BENZENE	9.13×10^{-01}	1.06	1.04×10^{-01}	1.50	9.95×10^{-02}	1.58×10^{-01}	-	1.25×10^{-01}	1.56	5.52
CARBON MONOXIDE	$3.18 \times 10^{+02}$	$2.35 \times 10^{+02}$	$6.27 \times 10^{+01}$	$4.08 \times 10^{+02}$	$4.38 \times 10^{+01}$	$7.20 \times 10^{+01}$	-	$2.13 \times 10^{+01}$	$2.90 \times 10^{+02}$	$1.45 \times 10^{+03}$
FORMALDEHYDE	4.86	7.24×10^{-01}	5.05×10^{-01}	$1.17 \times 10^{+01}$	1.27×10^{-01}	1.28	-	6.32×10^{-01}	1.48×10^{-01}	$2.00 \times 10^{+01}$
ISOMERS OF XYLENE	6.53×10^{-01}	4.25	1.31×10^{-01}	1.14	3.34×10^{-01}	1.85×10^{-01}	-	2.02×10^{-02}	8.91	$1.56 \times 10^{+01}$
LEAD AND COMPOUNDS	1.12×10^{-02}	1.37×10^{-04}	2.19×10^{-01}	1.55×10^{-03}	1.38×10^{-04}	1.21	-	1.18×10^{-04}	5.12×10^{-06}	1.44
OXIDES OF NITROGEN	$3.62 \times 10^{+01}$	$1.04 \times 10^{+02}$	$5.24 \times 10^{+01}$	$2.41 \times 10^{+03}$	$1.27 \times 10^{+01}$	$1.63 \times 10^{+02}$	-	$1.68 \times 10^{+02}$	5.17	$2.95 \times 10^{+03}$
PARTICULATE MATTER < 10 µm	2.98	7.04	$6.02 \times 10^{+01}$	$8.32 \times 10^{+01}$	9.91×10^{-01}	$3.02 \times 10^{+02}$	-	4.99	7.00	$4.69 \times 10^{+02}$
PARTICULATE MATTER < 2.5 µm	2.76	6.53	$2.75 \times 10^{+01}$	$7.96 \times 10^{+01}$	9.54×10^{-01}	$1.25 \times 10^{+02}$	-	4.51	6.45	$2.53 \times 10^{+02}$
POLYCYCLIC AROMATIC HYDROCARBONS	5.49×10^{-01}	1.38×10^{-01}	3.73×10^{-02}	7.72×10^{-01}	1.52×10^{-02}	8.74×10^{-02}	-	7.37×10^{-02}	3.03×10^{-01}	1.97
SULFUR DIOXIDE	3.64	2.51	1.64	$1.23 \times 10^{+03}$	3.87×10^{-01}	4.67	-	$2.34 \times 10^{+01}$	6.45×10^{-01}	$1.26 \times 10^{+03}$
TETRACHLOROETHYLENE	8.51×10^{-04}	3.10×10^{-02}	6.24×10^{-04}	-	2.28×10^{-03}	2.19×10^{-05}	-	-	1.04×10^{-01}	1.39×10^{-01}
TOLUENE	9.19×10^{-01}	3.90	1.52×10^{-01}	1.34	3.13×10^{-01}	2.35×10^{-01}	-	1.26×10^{-01}	7.27	$1.43 \times 10^{+01}$
TOTAL SUSPENDED PARTICULATES	3.14	7.41	$2.56 \times 10^{+02}$	$8.76 \times 10^{+01}$	1.04	$1.40 \times 10^{+03}$	-	5.25	7.37	$1.77 \times 10^{+03}$
TOTAL VOCS	$3.65 \times 10^{+01}$	$4.39 \times 10^{+01}$	7.86	$8.97 \times 10^{+01}$	4.10	$1.39 \times 10^{+01}$	-	7.20	$1.09 \times 10^{+02}$	$3.12 \times 10^{+02}$
TRICHLOROETHYLENE	5.23×10^{-04}	1.91×10^{-02}	3.83×10^{-04}	-	1.40×10^{-03}	1.34×10^{-05}	-	-	6.38×10^{-02}	8.51×10^{-02}

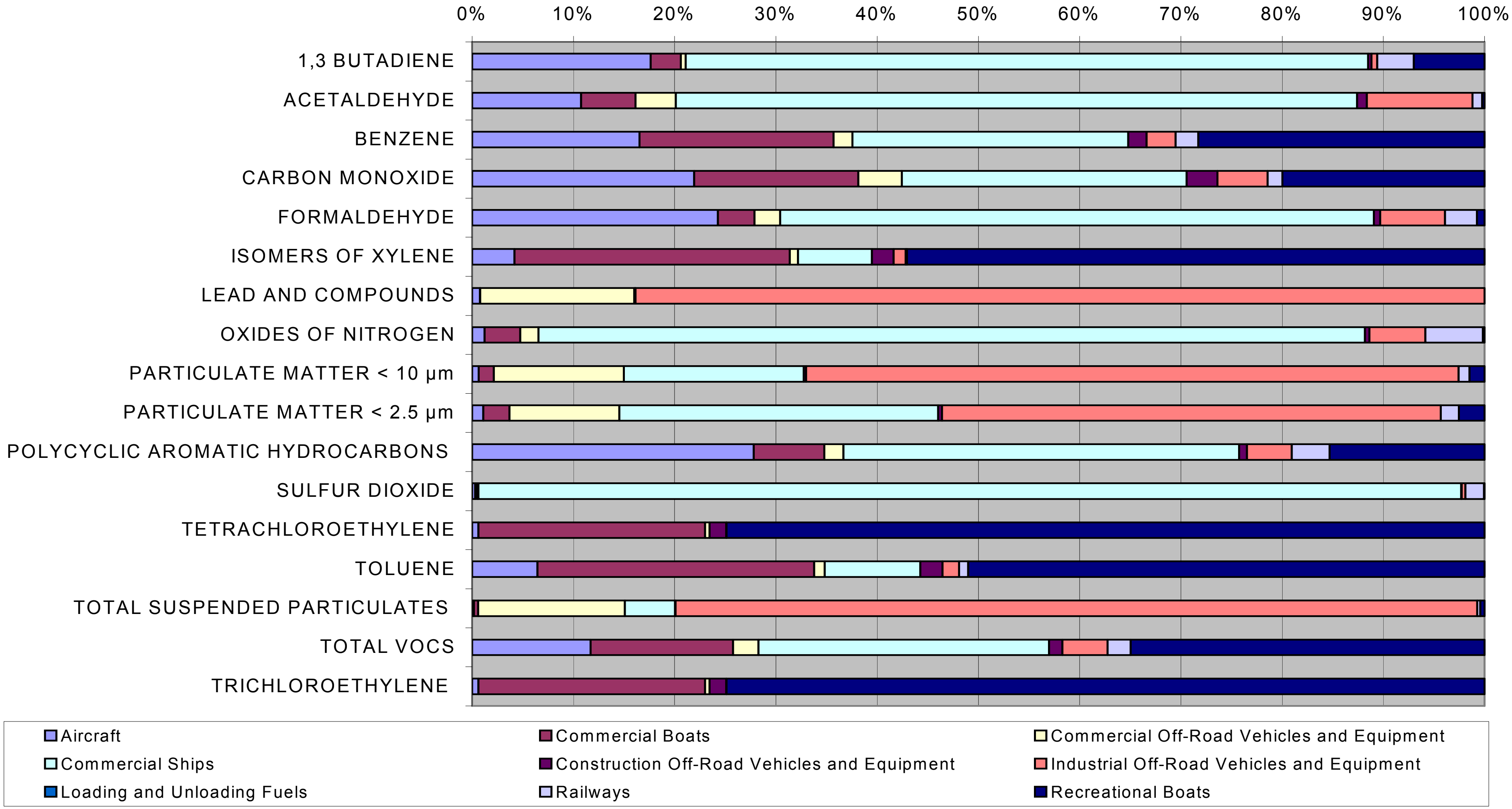

Figure ES1.5: Proportion of total estimated annual emissions by off-road mobile source type in the Newcastle region

Table ES1.6: Total estimated annual emissions by off-road mobile source type in the Wollongong region

Substance	Emissions (tonnes/year)									
	Aircraft	Commercial Boats	Commercial Off-Road Vehicles and Equipment	Commercial Ships	Construction Off-Road Vehicles and Equipment	Industrial Off-Road Vehicles and Equipment	Loading and Unloading Fuels	Railways	Recreational Boats	Off-Road Mobile Total
1,3 BUTADIENE	6.82×10^{-03}	6.20×10^{-02}	5.15×10^{-03}	3.80×10^{-01}	3.77×10^{-03}	2.72×10^{-02}	-	9.32×10^{-02}	2.98×10^{-01}	8.77×10^{-01}
ACETALDEHYDE	1.54×10^{-02}	8.14×10^{-01}	3.17×10^{-01}	2.77	8.00×10^{-02}	3.59	-	1.75×10^{-01}	8.09×10^{-02}	7.83
BENZENE	1.18×10^{-02}	7.01×10^{-01}	3.58×10^{-02}	2.70×10^{-01}	3.60×10^{-02}	2.37×10^{-01}	5.15×10^{-02}	1.02×10^{-01}	2.12	3.56
CARBON MONOXIDE	7.77	$1.56 \times 10^{+02}$	$2.17 \times 10^{+01}$	$7.33 \times 10^{+01}$	$1.59 \times 10^{+01}$	$1.08 \times 10^{+02}$	-	$1.74 \times 10^{+01}$	$3.93 \times 10^{+02}$	$7.93 \times 10^{+02}$
FORMALDEHYDE	4.91×10^{-02}	4.79×10^{-01}	1.75×10^{-01}	2.11	4.60×10^{-02}	1.92	-	5.18×10^{-01}	2.00×10^{-01}	5.49
ISOMERS OF XYLENE	1.01×10^{-02}	2.81	4.53×10^{-02}	2.04×10^{-01}	1.21×10^{-01}	2.78×10^{-01}	3.70×10^{-02}	1.65×10^{-02}	$1.21 \times 10^{+01}$	$1.56 \times 10^{+01}$
LEAD AND COMPOUNDS	3.63×10^{-04}	9.07×10^{-05}	7.59×10^{-02}	2.78×10^{-04}	4.98×10^{-05}	1.81	-	9.69×10^{-05}	6.94×10^{-06}	1.89
OXIDES OF NITROGEN	5.62×10^{-01}	$6.90 \times 10^{+01}$	$1.81 \times 10^{+01}$	$4.32 \times 10^{+02}$	4.59	$2.45 \times 10^{+02}$	-	$1.37 \times 10^{+02}$	7.00	$9.14 \times 10^{+02}$
PARTICULATE MATTER < 10 µm	1.51×10^{-01}	4.66	$2.09 \times 10^{+01}$	$1.49 \times 10^{+01}$	3.59×10^{-01}	$4.53 \times 10^{+02}$	-	4.09	9.49	$5.08 \times 10^{+02}$
PARTICULATE MATTER < 2.5 µm	1.39×10^{-01}	4.33	9.51	$1.43 \times 10^{+01}$	3.46×10^{-01}	$1.87 \times 10^{+02}$	-	3.70	8.73	$2.28 \times 10^{+02}$
POLYCYCLIC AROMATIC HYDROCARBONS	1.56×10^{-02}	9.13×10^{-02}	1.29×10^{-02}	1.39×10^{-01}	5.51×10^{-03}	1.31×10^{-01}	-	6.04×10^{-02}	4.10×10^{-01}	8.65×10^{-01}
SULFUR DIOXIDE	4.37×10^{-02}	1.66	5.69×10^{-01}	$2.20 \times 10^{+02}$	1.40×10^{-01}	7.01	-	$1.92 \times 10^{+01}$	8.73×10^{-01}	$2.50 \times 10^{+02}$
TETRACHLOROETHYLENE	4.14×10^{-07}	2.05×10^{-02}	2.16×10^{-04}	-	8.24×10^{-04}	3.28×10^{-05}	-	-	1.41×10^{-01}	1.62×10^{-01}
TOLUENE	1.69×10^{-02}	2.58	5.26×10^{-02}	2.41×10^{-01}	1.13×10^{-01}	3.53×10^{-01}	1.24×10^{-01}	1.03×10^{-01}	9.85	$1.34 \times 10^{+01}$
TOTAL SUSPENDED PARTICULATES	1.58×10^{-01}	4.91	$8.86 \times 10^{+01}$	$1.57 \times 10^{+01}$	3.78×10^{-01}	$2.10 \times 10^{+03}$	-	4.31	9.99	$2.22 \times 10^{+03}$
TOTAL VOCS	4.08×10^{-01}	$2.91 \times 10^{+01}$	2.72	$1.61 \times 10^{+01}$	1.49	$2.08 \times 10^{+01}$	7.71	5.90	$1.48 \times 10^{+02}$	$2.32 \times 10^{+02}$
TRICHLOROETHYLENE	2.54×10^{-07}	1.26×10^{-02}	1.33×10^{-04}	-	5.06×10^{-04}	2.01×10^{-05}	-	-	8.64×10^{-02}	9.97×10^{-02}

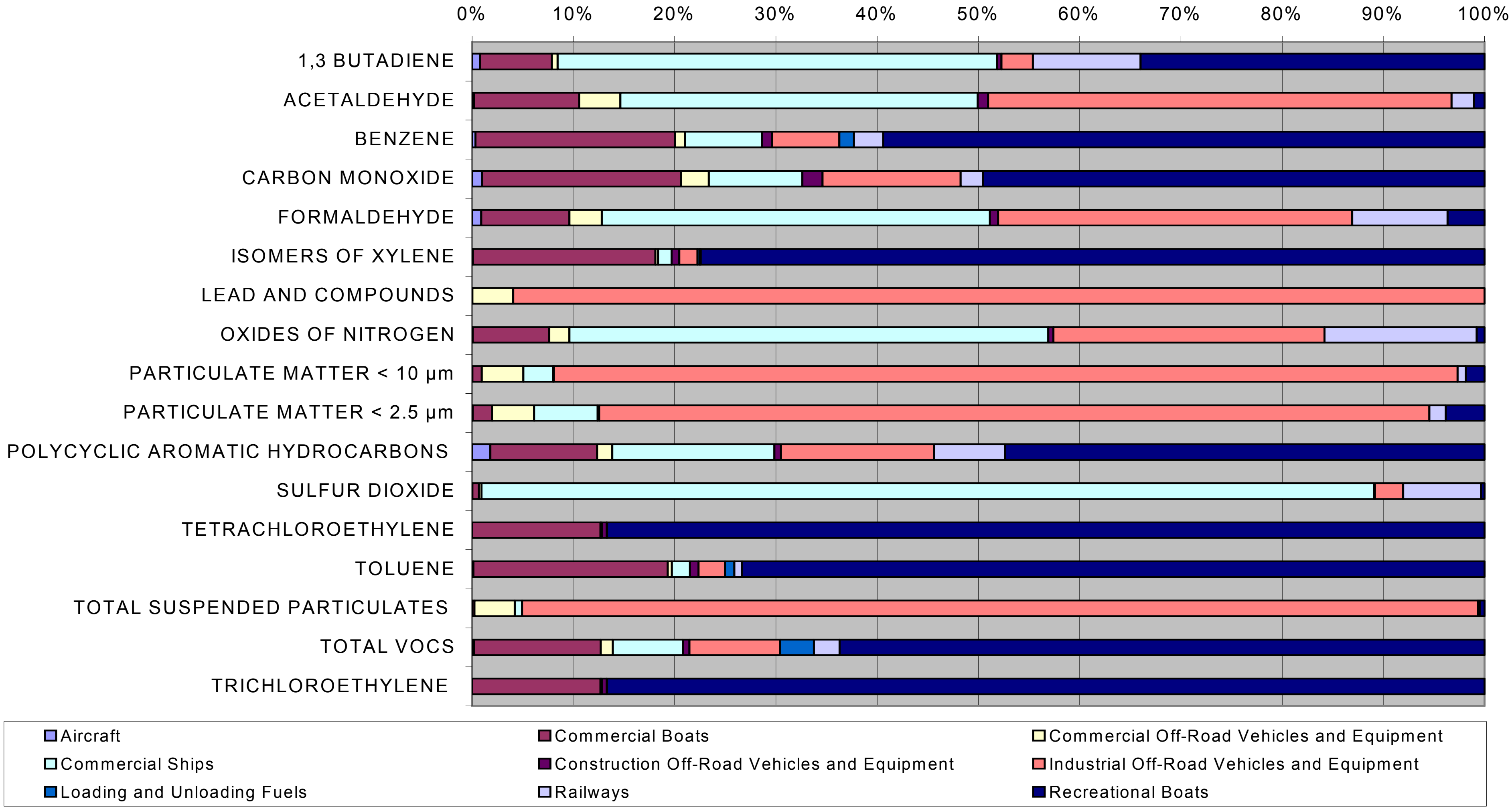

Figure ES1.6: Proportion of total estimated annual emissions by off-road mobile source type in the Wollongong region

Table ES1.7: Total estimated annual emissions by off-road mobile source type in the Non-Urban region

Substance	Emissions (tonnes/year)									
	Aircraft	Commercial Boats	Commercial Off-Road Vehicles and Equipment	Commercial Ships	Construction Off-Road Vehicles and Equipment	Industrial Off-Road Vehicles and Equipment	Loading and Unloading Fuels	Railways	Recreational Boats	Off-Road Mobile Total
1,3 BUTADIENE	9.72×10^{-02}	1.30	1.41×10^{-01}	1.52	2.47×10^{-02}	5.43×10^{-01}	-	9.75×10^{-01}	2.17	6.78
ACETALDEHYDE	7.52×10^{-01}	$1.71 \times 10^{+01}$	8.69	$1.11 \times 10^{+01}$	5.26×10^{-01}	$7.15 \times 10^{+01}$	-	1.84	5.90×10^{-01}	$1.12 \times 10^{+02}$
BENZENE	2.30×10^{-01}	$1.47 \times 10^{+01}$	9.84×10^{-01}	1.08	2.37×10^{-01}	4.73	-	1.07	$1.54 \times 10^{+01}$	$3.85 \times 10^{+01}$
CARBON MONOXIDE	$1.84 \times 10^{+02}$	$3.27 \times 10^{+03}$	$5.96 \times 10^{+02}$	$2.93 \times 10^{+02}$	$1.04 \times 10^{+02}$	$2.15 \times 10^{+03}$	-	$1.82 \times 10^{+02}$	$2.86 \times 10^{+03}$	$9.65 \times 10^{+03}$
FORMALDEHYDE	9.31×10^{-01}	$1.01 \times 10^{+01}$	4.80	8.42	3.02×10^{-01}	$3.83 \times 10^{+01}$	-	5.42	1.46	$6.97 \times 10^{+01}$
ISOMERS OF XYLENE	2.25×10^{-01}	$5.91 \times 10^{+01}$	1.24	8.17×10^{-01}	7.96×10^{-01}	5.55	-	1.73×10^{-01}	$8.80 \times 10^{+01}$	$1.56 \times 10^{+02}$
LEAD AND COMPOUNDS	1.20×10^{-02}	1.91×10^{-03}	2.08	1.11×10^{-03}	3.27×10^{-04}	$3.62 \times 10^{+01}$	-	1.01×10^{-03}	5.05×10^{-05}	$3.83 \times 10^{+01}$
OXIDES OF NITROGEN	$1.23 \times 10^{+01}$	$1.45 \times 10^{+03}$	$4.98 \times 10^{+02}$	$1.73 \times 10^{+03}$	$3.01 \times 10^{+01}$	$4.88 \times 10^{+03}$	-	$1.44 \times 10^{+03}$	$5.10 \times 10^{+01}$	$1.01 \times 10^{+04}$
PARTICULATE MATTER < 10 µm	3.13	$9.80 \times 10^{+01}$	$5.72 \times 10^{+02}$	$5.98 \times 10^{+01}$	2.36	$9.04 \times 10^{+03}$	-	$4.28 \times 10^{+01}$	$6.91 \times 10^{+01}$	$9.88 \times 10^{+03}$
PARTICULATE MATTER < 2.5 µm	2.89	$9.10 \times 10^{+01}$	$2.61 \times 10^{+02}$	$5.72 \times 10^{+01}$	2.27	$3.73 \times 10^{+03}$	-	$3.87 \times 10^{+01}$	$6.36 \times 10^{+01}$	$4.24 \times 10^{+03}$
POLYCYCLIC AROMATIC HYDROCARBONS	4.06×10^{-01}	1.92	3.54×10^{-01}	5.54×10^{-01}	3.62×10^{-02}	2.61	-	6.32×10^{-01}	2.99	9.50
SULFUR DIOXIDE	1.22	$3.50 \times 10^{+01}$	$1.56 \times 10^{+01}$	$8.81 \times 10^{+02}$	9.22×10^{-01}	$1.40 \times 10^{+02}$	-	$2.01 \times 10^{+02}$	6.36	$1.28 \times 10^{+03}$
TETRACHLOROETHYLENE	4.10×10^{-04}	4.32×10^{-01}	5.93×10^{-03}	-	5.42×10^{-03}	6.54×10^{-04}	-	-	1.02	1.47
TOLUENE	3.13×10^{-01}	$5.43 \times 10^{+01}$	1.44	9.64×10^{-01}	7.45×10^{-01}	7.04	-	1.08	$7.18 \times 10^{+01}$	$1.38 \times 10^{+02}$
TOTAL SUSPENDED PARTICULATES	3.29	$1.03 \times 10^{+02}$	$2.43 \times 10^{+03}$	$6.29 \times 10^{+01}$	2.48	$4.19 \times 10^{+04}$	-	$4.51 \times 10^{+01}$	$7.28 \times 10^{+01}$	$4.46 \times 10^{+04}$
TOTAL VOCS	8.52	$6.12 \times 10^{+02}$	$7.46 \times 10^{+01}$	$6.44 \times 10^{+01}$	9.77	$4.15 \times 10^{+02}$	-	$6.18 \times 10^{+01}$	$1.08 \times 10^{+03}$	$2.32 \times 10^{+03}$
TRICHLOROETHYLENE	2.52×10^{-04}	2.65×10^{-01}	3.64×10^{-03}	-	3.33×10^{-03}	4.02×10^{-04}	-	-	6.29×10^{-01}	9.03×10^{-01}

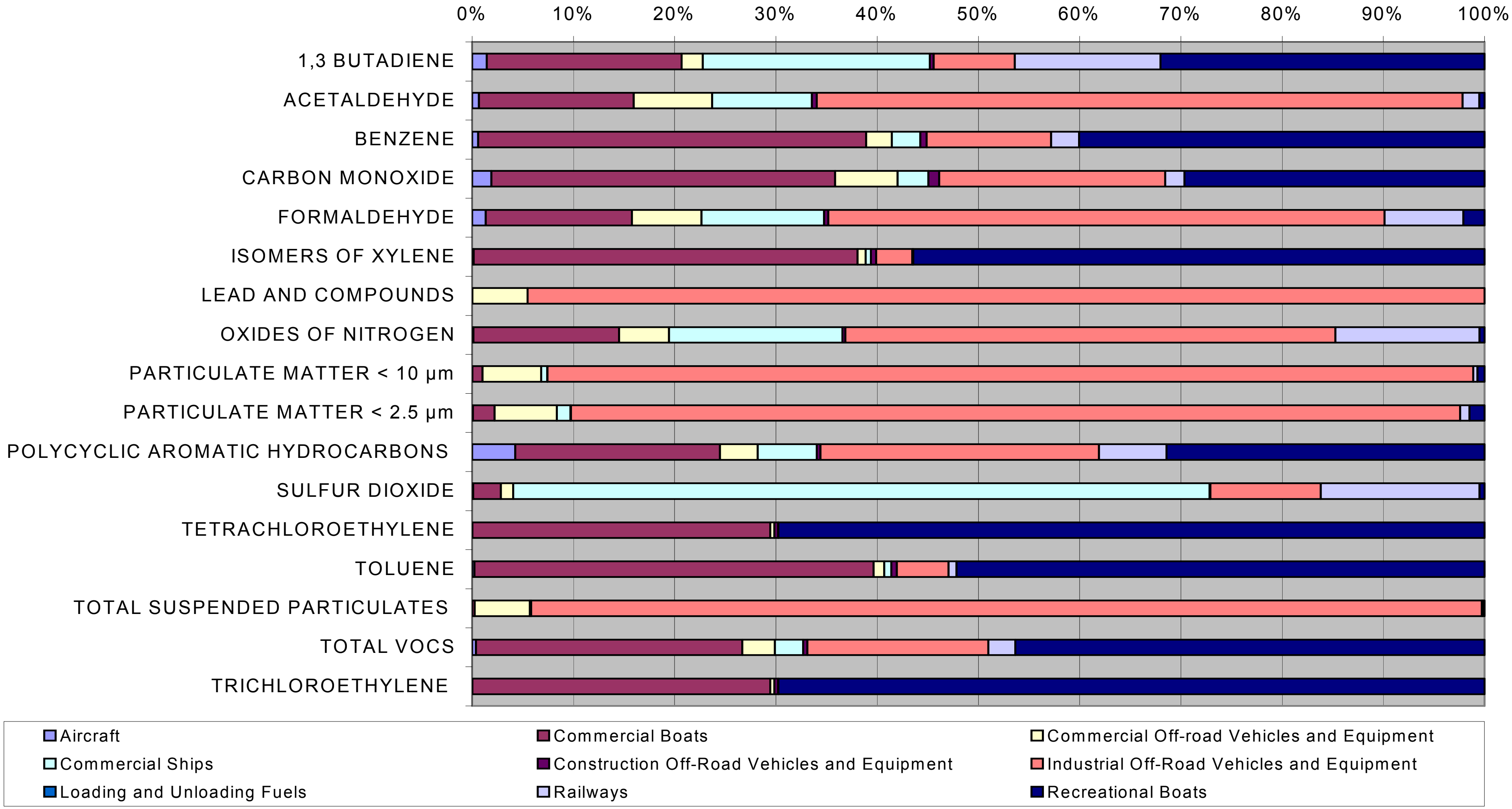

Figure ES1.7: Proportion of total estimated annual emissions by off-road mobile source type in the Non-Urban region

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1 Introduction

The Department of Environment and Climate Change NSW (DECC), in collaboration with Optimised Operations (Tseng et. al., 2006), has completed a three year air emissions inventory project for off-road mobile sources. The base year of the off-road mobile inventory represents activities that took place during the 2003 calendar year and is accompanied by emission projections in yearly increments up to the 2031 calendar year. The area included in the study covers greater Sydney, Newcastle and Wollongong regions, known collectively as the Greater Metropolitan Region (GMR).

The purpose of this document is to focus on the results of the off-road mobile air emissions inventory. The information is structured as follows:

- A description of the off-road mobile air emissions inventory specification (Section 2) including:
    - The study year of the inventory (Section 2.1);
    - A description of the study region (Section 2.2);
    - A description of the grid coordinate system (Section 2.3);
    - A description of the emission sources considered (Section 2.4);
    - A description of the pollutants evaluated (Section 2.5); and
    - A broad discussion of the methodology (Section 2.6).
- An emissions summary for selected substances presented by off-road mobile source type for the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions (Section 3).
- An emissions summary for selected substances presented for all off-road mobile sources for the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions (Section 4).
- A complete list of references (Section 5).
- A sample industrial and commercial survey questionnaire form used to collect activity data (Appendix A).
- A sample domestic survey questionnaire form used to collect activity data (Appendix B).
- Total off-road mobile emissions of all substances emitted in the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions (Appendix C).

2 Inventory Specifications

2.1 The Study Year

The off-road mobile air emissions inventory results presented in this report are based on activities that took place in the 2003 calendar year.

2.2 The Study Region

The study region defined as the GMR measures 210 km (east-west) by 273 km (north-south). The study region is defined in Table 2.1 and shown in Figure 2.2.

Table 2.1: Definition of Greater Metropolitan, Sydney, Newcastle and Wollongong Regions

Region	South-west corner MGA [1] co-ordinates		North-east corner MGA [1] co-ordinates	
	Easting (km)	Northing (km)	Easting (km)	Northing (km)
Greater Metropolitan	210	6159	420	6432
Sydney	261	6201	360	6300
Newcastle	360	6348	408	6372
Wollongong	279	6174	318	6201

[1] MGA = Map Grid of Australia based on the Geocentric Datum of Australia 1994 (GDA94) (ICSM, 2002).

2.3 Grid Coordinate System

The grid coordinate system used for the off-road mobile air emissions inventory uses 1 km by 1 km grid cells. The grid coordinates start from the bottom left corner having index number with Easting (km) in the horizontal and Northing (km) in the vertical direction. The grid coordinate system is illustrated in Figure 2.1.

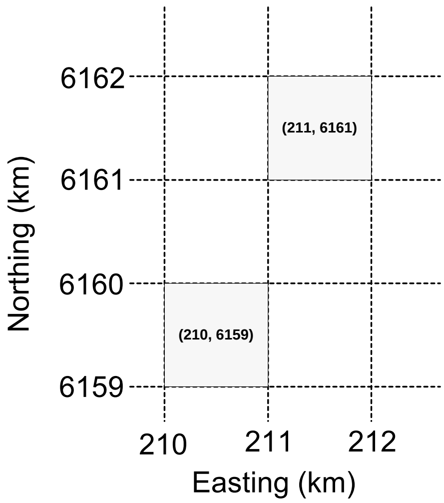

Figure 2.1: Grid coordinate system

Figure 2.2: Definition of Greater Metropolitan, Sydney, Newcastle and Wollongong Regions

2.4 Emission Sources Considered

The off-road mobile air emissions inventory includes emissions from the following sources:

- Aircraft;
- Commercial boats;
- Commercial off-road vehicles and equipment;
- Commercial ships;
- Construction off-road vehicles and equipment;
- Industrial off-road vehicles and equipment;
- Loading and unloading petroleum products;
- Railways; and
- Recreational boats.

2.5 Pollutants Evaluated

The inventory includes off-road mobile emission releases to air in the region depicted by Figure 2.2. The following pollutants have been considered:

- Substances included in the National Pollutant Inventory (NPI) National Environment Protection Measure (NEPC, 2000);
- Pollutants included in the Air Quality National Environment Protection Measure (NEPC, 2003);
- Pollutants included in the Air Toxics National Environment Protection Measure (NEPC, 2004);
- Pollutants associated with the Protection of the Environment Operations (Clean Air) Regulation 2002 (PCO, 2005);
- Air pollutants associated with the Protection of the Environment Operations (General) Regulation 1998 (PCO, 1998);
- Speciation of oxides of nitrogen for photochemical modelling (i.e. NO and NO_2)[1];
- Speciated organic compounds for photochemical modelling sourced from Carter (2003);
- Speciated particulate emissions (i.e. TSP (total suspended particulate), PM_{10} (particulate matter with an aerodynamic diameter < 10 μm) and $PM_{2.5}$ (particulate matter with an aerodynamic diameter < 2.5 μm));
- Environment Protection Authority of Victoria air toxic pollutants sourced from Hazardous Air Pollutants - A Review of Studies Performed in Australia and New Zealand (EPAV, 1999);
- Commonwealth Government Air Toxics Program Technical Advisory Group (13 March 2000) priority air pollutants (DEH, 2001);
- U.S. Environmental Protection Agency list of 189 Hazardous Air Pollutants (USEPA, 2005b);

[1] The default NO_x speciation profile used in the inventory is 5% NO_2 and 95% NO (USEPA, 2005a).

- Air pollutants included in the Office of Environmental Human Health Assessment (OEHHA)/Air Resources Board (ARB) 'hot spots' list (CARB, 2005);

- NSW DEC regulated pollutants with design ground level concentrations (DEC, 2005);

- USEPA 16 priority polycyclic aromatic hydrocarbons (PAHs) (Keith et. al., 1979); and

- WHO97 polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs) and polychlorinated biphenyls (PCBs) (Van den Berg et. al., 1998).

2.6 Methodology Overview

This section contains a broad overview of the methodology used to develop the off-road mobile air emissions inventory.

The methodology used to develop the off-road mobile air emissions inventory involved the following steps:

1. Off-Road Mobile Source Identification

Off-road mobile sources considered in this project include all sources defined in Section 2.4 with the potential for air emissions in the GMR.

Off-road mobile air emission sources have been identified from a number of different sources including:

- National Pollutant Inventory (NPI) aggregated emissions data (AED) sources (DEH, 2005a);

- USEPA AP-42 Compilation of Air Pollutant Emission Factors (USEPA, 1995a);

- USEPA Emission Inventory Improvement Program (EIIP) (USEPA, 2005c & USEPA, 2005d); and

- USEPA National Emissions Inventory (NEI) (ERG, 2003).

2. Emission Estimation Technique Design

Emission estimation techniques for off-road mobile sources have been based on the following methodologies:

- National Pollutant Inventory (NPI) aggregated emissions data (AED) emission estimation technique manuals (DEH, 2005b);

- FAA Emissions and Dispersion Modelling System (EDMS) Version 4.21 (FAA, 2004);

- USEPA AP-42 Compilation of Air Pollutant Emission Factors (USEPA, 1995a);

- USEPA Emission Inventory Improvement Program (EIIP) (USEPA, 2005c & USEPA, 2005d);

- USEPA National Emissions Inventory (NEI) (ERG, 2003);

- USEPA Final NONROAD2005 Model (USEPA, 2005e); and

- USEPA Speciate V3.2 database (USEPA, 2002).

3. Activity Data Acquisition

❑ Commercial off-road vehicles and equipment

A commercial survey was conducted during 2004 and 2005 to obtain activity data for commercial off-road vehicles and equipment (DECC, 2007a). The purpose of the commercial survey was to obtain sufficient data so that emissions of combustion products and wheel generated dust emissions could be estimated from the use of unregistered 4-stroke petrol, diesel and liquefied petroleum gas (LPG) engines on paved and unpaved roads for various commercial activities. The following activity data was collected through the commercial survey:

- Off-road vehicle/equipment operating location;
- Number and type of vehicle/equipment;
- Vehicle/equipment year and model;
- Engine size or power rating and fuel type;
- Fuel usage;
- Operating time, frequency and duration;
- Vehicle kilometres travelled (VKT); and
- Proportion of VKT on paved and unpaved roads.

A sample commercial survey questionnaire form used to collect activity data is presented in Appendix A.

❑ Industrial off-road vehicles and equipment

An industrial survey was conducted during 2004 and 2005 to obtain activity data for industrial off-road vehicles and equipment (DECC, 2007b). A total of 1090 facilities were mailed questionnaires on 17 November 2004. The industrial questionnaires were sent out under a NSW EPA notice to provide information and/or records under section 191 of the Protection of the Environment (Operations) Act 1997. Questionnaires were requested to be returned to the NSW EPA by 30 December 2004, after which follow up e-mails and phone calls were made to premises that had failed to return questionnaires. A further 71 facilities were identified and mailed questionnaires between 10 January 2005 and 14 February 2005. These were also issued under a section 191 notice and the same follow up process was used to ensure accurate and timely responses. All industrial facilities responded to the inventory questionnaire.

The purpose of the industrial survey was to obtain sufficient data so that emissions of combustion products and wheel generated dust emissions could be estimated from the use of unregistered 4-stroke petrol, compressed natural gas (CNG), diesel, electric, liquefied natural gas (LNG) and liquefied petroleum gas (LPG) engines on paved and unpaved roads for various industrial activities. The following activity data was collected through the industrial survey:

- Off-road vehicle/equipment operating location;
- Number and type of vehicle/equipment;
- Vehicle/equipment year and model;
- Engine size or power rating and fuel type;
- Fuel usage;
- Operating time, frequency and duration;
- Vehicle kilometres travelled (VKT); and

- Proportion of VKT on paved and unpaved roads.

A sample industrial survey questionnaire form used to collect activity data is presented in Appendix A.

- **Recreational boats**

A domestic survey was conducted as part of this study, in accordance with National Pollutant Inventory (NPI) guidelines for the conduct of domestic surveys (DEH, 2005b), to provide activity data for recreational boats.

Households were selected at random across the GMR to limit bias. Two thousand (2,000) survey questionnaire forms were mailed out in the first quarter of 2005 and three hundred and four (304) completed survey questionnaire forms were returned. A campaign of additional phone surveys was conducted in the second quarter of 2005 using the same survey questions to increase the total sample size to five hundred (500).

Based on a population of 5,091,366 in the GMR for the 2003 calendar year (TPDC, 2004 & ABS, 2001) and a sample size of 500, the confidence interval is 4.38% at the 95% confidence level.

The confidence interval quantifies the uncertainty or range in possible values. For example, for a confidence interval of 4.38% and where 47% percent of the sample picks a particular answer one can be "sure" that if the question has been asked of the entire relevant population, between 42.62% (47-4.38) and 51.38% (47+4.38) would have picked that answer.

The confidence level quantifies the level of certainty to which an estimate can be trusted. It is expressed as a percentage and represents how often the true percentage of the population who would pick an answer lies within the confidence interval. The 95% confidence level means one can be 95% certain. Most researchers use the 95% confidence level.

When combining the confidence level and confidence interval together, one can be 95% sure that the true answer for the entire relevant population is between 42.62% and 51.38% for the example described above.

The domestic survey questionnaire form is presented in Appendix B.

- **Other sources**

Additional sources of information have been used to obtain activity data for the following sources:

- Aircraft;
  - See section 3.1.3 for specific details.
- Commercial boats;
  - See section 3.2.3 for specific details.
- Commercial ships;
  - See section 3.4.3 for specific details.
- Construction off-road vehicles and equipment;
  - See section 3.5.3 for specific details.
- Loading and unloading petroleum products; and
  - See Section 3.7.3 for specific details.
- Railways.
  - See Section 3.8.3 for specific details.

4. Emission Estimation

Generally, emissions have been estimated by combining activity data with emission factors. The emissions have been allocated spatially to each 1 km by 1 km grid cell, and temporally to months, weekdays/weekend days and hours. Specific details of the methodology for each off-road mobile source type are provided in Section 3.

5. Deriving Off-Road Mobile Source Specific Emission Projection Factors

Emission projection factors for each off-road mobile source type have been developed using either published:

- ❑ Primary energy usage growth data (ABARE, 2005b); or
- ❑ Total or free standing dwelling growth data (ABS, 2001 & TPDC, 2004).

Emission projection factors have been developed for every year from 2004 to 2031 (emissions for the base year 2003 are based on the activity data obtained coupled with the emission estimation techniques). Emission projection factors are provided to the year 2031.

The emission projection factors for each source have been used to estimate emissions in future annual periods using the following formula (Pechan, 1999):

$$E_{i,j,k,n} = E_{i,j,k,2003} \times PF_{j,k,n}$$

where:

$E_{i,j,k,n}$	=	Emission of substance i from location j for source type k for year n	(tonnes/year)
$E_{i,j,k,2003}$	=	Emission of substance i from location j for source type k for the base year 2003	(tonnes/year)
$PF_{j,k,n}$	=	Emission projection factor for location j for source type k for year n (relative to the base year)	(dimensionless)

The projection methodology for each off-road mobile source type is presented in Section 3.

3 Data Sources and Results

This section presents the data sources used and the associated emission estimates for the 2003 calendar year for the following off-road mobile sources:

- Aircraft;
- Commercial boats;
- Commercial off-road vehicles and equipment;
- Commercial ships;
- Construction off-road vehicles and equipment;
- Industrial off-road vehicles and equipment;
- Loading and unloading petroleum products;
- Railways; and
- Recreational boats.

The emission estimation techniques used for off-road mobile sources have been based on the following methodologies:

- FAA Emissions and Dispersion Modelling System (EDMS) Version 4.21 (FAA, 2004);
- National Pollutant Inventory (NPI) aggregated emissions data (AED) emission estimation technique manuals (DEH, 2005b);
- USEPA AP-42 Compilation of Air Pollutant Emission Factors (USEPA, 1995a);
- USEPA Emission Inventory Improvement Program (EIIP) (USEPA, 2005c & USEPA, 2005d);
- USEPA National Emissions Inventory (NEI) (ERG, 2003);
- USEPA Final NONROAD2005 Model (USEPA, 2005e); and
- USEPA Speciate V3.2 database (USEPA, 2002).

In this section, total estimated emissions (for selected substances) are presented from each off-road mobile source type in the study region (i.e. GMR), Sydney, Newcastle and Wollongong regions. Total estimated emissions are also presented for the region defined as Non-Urban. This region is the area of the GMR minus the combined areas of the Sydney, Newcastle and Wollongong regions. In this section emissions are presented for the following pollutants only:

- 1,3-butadiene
- Acetaldehyde
- Benzene
- Carbon monoxide (CO)
- Formaldehyde
- Isomers of xylene

- Lead and compounds
- Oxides of nitrogen (NO_x)
- Particulate matter < 10 µm (PM_{10})
- Particulate matter < 2.5 µm ($PM_{2.5}$)
- Polycyclic aromatic hydrocarbons (PAHs)
- Sulfur dioxide (SO_2)
- Tetrachloroethylene
- Toluene
- Total suspended particulates (TSP)
- Total volatile organic compounds (Total VOCs)
- Trichloroethylene

These substances have been selected since they are:

- The most common air pollutants found in airsheds according to the National Pollutant Inventory (NEPC, 2000);
- Referred to in National Environment Protection Measures (NEPMs) for criteria pollutants (NEPC, 2003) and air toxics (NEPC, 2004); and
- They have been classified as priority air pollutants (NEPC, 2005).

Total off-road mobile emissions of all substances emitted in the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions are presented in Appendix C.

3.1 Aircraft

3.1.1 Emission Source Description

Emission sources of combustion products from aircraft, auxiliary power units, ground support equipment, engine testing, and evaporative VOC emissions from fuel storage and transfer at airports included in the off-road mobile air emissions inventory are as follows:

- **Airport locations:**
  - Albion Park, Bankstown, Belmont, Camden, Cessnock, Sydney and Williamtown.
- **Aircraft landing-takeoff (LTO) cycles for various aviation types:**
  - *Domestic aviation.* This includes aircraft movements between major airports within Australia. Domestic airlines provide scheduled regular services within Australia and primarily operate high-capacity jet aircraft between major airports;
  - *General aviation.* This includes all non-scheduled aircraft movements in Australian registered aircraft, other than major domestic and international aviation. This type of aviation includes aerial agricultural, business, charter and private use, training activities and other aerial work. General aviation also includes sport aviation, such as ultra light aircraft, gliders and autogyros;
  - *International aviation.* This includes aircraft movements between an Australian airport and an airport in another country;
  - *Military aviation.* This includes only those aircraft movements reported by AirServices Australia (2005)[2]; and
  - *Regional aviation.* This includes all scheduled regular aircraft movements between smaller rural airports and major airports within Australia.
- **Aircraft LTO include four modes of travel (which constitute a LTO cycle) as follows:**
  - *Approach mode.* Emissions are estimated for the period between when the aircraft reaches approximately 920 metres above ground level (AGL) to landing on the tarmac;
  - *Taxi/idle mode.* Emissions are estimated for both incoming and outgoing aircraft during the period when the aircraft is either taxiing or idling;
  - *Takeoff mode.* Emissions are estimated for the period between when the aircraft commences acceleration on the tarmac and reaches approximately 305 metres AGL; and
  - *Climbout mode.* Emissions are estimated for the period between when the aircraft reaches approximately 305 metres AGL and approximately 920 metres AGL.
- **Auxiliary power unit (APU) and ground support equipment (GSE):**
  - *Auxiliary power unit (APU)*. This includes on-board generators that provide electrical power to the aircraft while its engines are shut down. Some pilots start the on-board APU while taxiing to the gate but, for the most part, it is started when the aircraft reaches the gate; and
  - *Ground support equipment (GSE).* Upon arrival at a gate, aircraft are met by GSE to unload baggage and service the lavatory and cabin. While an aircraft is parked at a gate, mobile generators and air conditioning units may be in operation to provide electricity and conditioned air. Prior to aircraft departure, GSE are present to load baggage, food and fuel. When an aircraft departs from a gate, a tug may be used to push or tow the aircraft away from the gate and to the taxiway.
- **Engine testing:**
  - This includes aircraft engine testing at Sydney Airport.
- **Fuel storage and transfer:**
  - The common fuel storage tanks are horizontal tanks and vertical tanks. They can be either located above or below the ground surface. Evaporative VOC emissions from the storage and transfer of *Avtur* and *Avgas* have been estimated.

[2] AirServices Australia only maintains data for military aircraft movements at airports where the control towers are within its jurisdiction. Data for military aircraft movements at airports with RAAF control towers (i.e. Richmond and Williamtown) were not available for this study (AirServices Australia, 2005).

3.1.2 Emission Estimation Methodology

- **Aircraft LTO**

Emissions from aircraft LTO have been estimated using the preferred method (Environment Australia, 2001 & Environment Australia, 2003), which requires airport location, number of aircraft LTO, engine type and time spent in each operating mode data to be obtained from aviation authorities. This information has been combined with time based emission factors for each aircraft type using the EDMS Version 4.21 model (FAA, 2004) to estimate emissions of each substance. Emissions from aircraft LTO have been calculated using the following formula:

$$E_{i,j,k} = EF_{i,j,k} \times SF_{i,j} \times LTO_{j} \times TIM_{j,k}$$

where:

$E_{i,j,k}$	=	Emission of substance i from aircraft type j for mode of operation k	(kg/year)
$EF_{i,j,k}$	=	Time based emission factor of substance i from aircraft type j for mode of operation k	(kg/hour)
$SF_{i,j}$	=	NO_x, VOC or PM speciation factor of substance i for aircraft type j	(%)
LTO_j	=	Number of LTO for aircraft type j	(Number/year)
$TIM_{j,k}$	=	Time spent for aircraft type j in mode of operation k	(hour)

- **APU and GSE**

Emissions from APU and GSE have been estimated using the preferred method (Environment Australia, 2001 & Environment Australia, 2003), which requires airport location, number of aircraft LTO, APU and GSE engine type and time spent operating APU and GSE data to be obtained from aviation authorities. This information has been combined with time based emission factors for each APU and GSE type using the EDMS Version 4.21 model (FAA, 2004) to estimate emissions of each substance. Emissions from APU and GSE have been calculated using the following formula:

$$E_{i,j} = EF_{i,j} \times SF_{i,j} \times LTO_{j} \times TIM_{j}$$

where:

$E_{i,j}$	=	Emission of substance i from APU and GSE equipment type j	(kg/year)
$EF_{i,j}$	=	Time based emission factor of substance i from APU and GSE equipment type j	(kg/hour)
$SF_{i,j}$	=	NO_x, VOC or PM speciation factor of substance i for APU and GSE equipment type j	(%)
LTO_j	=	Number of LTO for APU and GSE equipment type j	(Number/year)
TIM_j	=	Time spent operating APU and GSE equipment type j	(hour)

- **Engine testing**

Emissions from engine testing have been estimated using the preferred method (Environment Australia, 2001 & Environment Australia, 2003), which requires airport location, number of engine tests for each engine type, average load and duration of each engine test data to be obtained from aviation authorities. This information has been combined with time based emission factors for each engine type using the EDMS Version 4.21 model (FAA, 2004) to estimate emissions of each substance. Emissions from engine testing have been calculated using the same formula as aircraft LTO.

- **Fuel storage and transfer**

Evaporative VOC emission estimates from the storage and transfer of *Avtur* and *Avgas* have been obtained from fuel suppliers.

3.1.3 Activity Data

Activity data required for estimating emissions from aircraft includes:

- **Aircraft LTO**
  - The location of airports, runways, landing and approach flight paths, and associated ground movements, in the airshed;
  - The number of landing/takeoff (LTO) cycles for each aircraft type operating at these airports;
  - The prevalence of the different types of engines (and numbers of engines) used by each aircraft type; and
  - The time spent in each operating mode (approach, taxi/idle, takeoff and climbout) for each airport.

For Bankstown, Belmont, Camden, Sydney and Williamtown airports, activity data have been obtained from: AirServices Australia, 2005; BTRE, 2004a; BTRE, 2004b; BTRE, 2004c; BTRE, 2006; and DOTARS, 2005. For Albion Park and Cessnock airports, activity data have been derived from: AirServices Australia, 2005, BTRE, 2004a; BTRE, 2004b; BTRE, 2004c; BTRE, 2006; and DOTARS, 2005 using fuel consumption data included in Table 3.4. Table 3.1 includes the number of commercial, general and military aviation and helicopters LTO, and total aircraft LTO for each airport in the GMR. The total numbers of aircraft LTO by engine type for each airport are presented in Table 3.2.

Table 3.1: Aircraft – aircraft LTO activity data by aviation type during 2003 in the GMR

Airport [1,2]	Commercial Aviation LTO [3]	General Aviation LTO [4]		Military Aviation LTO [5]	Helicopters LTO [6]	Total Aircraft LTO	Data Source
		Air Taxi	Other				
Albion Park	216	12	814	1	16	1,059	See footnote 2
Bankstown	224	13,402	136,468	112	15,758	165,964	See footnote 1
Belmont	-	5,180	102	-	14	5,296	See footnote 1
Camden	5,001	278	18,870	33	362	24,544	See footnote 1
Cessnock	2,252	125	8,496	15	163	11,051	See footnote 2
Sydney	151,114	19,059	29,169	36	7,325	206,703	See footnote 1
Williamtown	954	4,921	5,980	1,193	132	13,180	See footnote 1

[1] Data Source: (AirServices Australia, 2005; BTRE, 2004a; BTRE, 2004b; BTRE, 2004c; BTRE, 2006; & DOTARS, 2005).
[2] Data Source: Aircraft LTO activity data for Albion Park and Cessnock have been projected from Camden Aircraft LTO and fuel consumption data included in Tables 3.1, 3.2 and 3.4 respectively. Aircraft LTO for Albion Park and Cessnock are approximately 4.3% and 45% respectively of Aircraft LTO for Camden.
[3] Includes domestic and international cargo and passenger aviation.
[4] Includes air taxis, homebuilts, light planes and recreational aviation.
[5] Includes combat activities, flight missions and transport aviation.
[6] Includes both military and non-military helicopters.

Table 3.2: Aircraft – aircraft LTO activity data by engine type during 2003 in the GMR

Airport	Engine Type	Aircraft LTO	Total Aircraft LTO	Data Source
Albion Park	Piston Engine	818	1,059	See footnote 2, Table 3.1
	Turbine Engine	241		
Bankstown	Piston Engine	142,465	165,964	See footnote 1, Table 3.1
	Turbine Engine	23,499		
Belmont	Piston Engine	167	5,296	See footnote 1, Table 3.1
	Turbine Engine	5,129		
Camden	Piston Engine	18,966	24,544	See footnote 1, Table 3.1
	Turbine Engine	5,578		
Cessnock	Piston Engine	8,539	11,051	See footnote 2, Table 3.1
	Turbine Engine	2,511		
Sydney	Piston Engine	2,926	206,703	See footnote 1, Table 3.1
	Turbine Engine	203,777		
Williamtown	Piston Engine	1,704	13,180	See footnote 1, Table 3.1
	Turbine Engine	11,476		

❑ APU and GSE

- The location of airports in the airshed;
- The number of landing/takeoff (LTO) cycles for each aircraft type operating at these airports;
- The prevalence of the different types of APU and GSE used by each aircraft type; and
- The time spent operating APU and GSE at the airport.

The EDMS Version 4.21 Model (FAA, 2004) default settings for type, frequency and duration of APU and GSE equipment use have been used, in combination with the aircraft LTO data presented in Tables 3.1 and 3.2.

❑ Engine testing

- The location of engine testing in the airshed;
- The number of engine tests conducted for each engine type; and
- The average load and duration of each engine test.

For Sydney airport, activity data have been obtained from Qantas, 2005.

Table 3.3 includes the engine type, number of engine tests, duration of test and average load during the engine test for Sydney airport.

Table 3.3: Aircraft - engine testing activity data during 2003 in the GMR

Airport	Engine Type [1]	Number of Engine Tests [1,2]	Average Duration of Engine Test (minutes) [1]	Average Engine Load (% maximum) [1]
Sydney	Rolls Royce RB 211-524D4	29	~312	~75
Sydney	Rolls Royce RB 211-524G	28	~312	~75
Sydney	Rolls Royce RB 211-524H	28	~312	~75

[1] Data Source: (Qantas, 2005).
[2] Total fuel consumption during engine testing is 1,951,666 litres of Avtur.

❑ Fuel storage and transfer

For Albion Park, Bankstown, Camden, Cessnock, Sydney and Williamtown airports, evaporative emission estimates from the storage and transfer of Avtur and Avgas have been obtained from: BP, 2005; Caltex, 2005; Mobil, 2005; and Shell, 2005.

Table 3.4 includes the fuel type, amount of fuel consumed and evaporative VOC emissions for each airport in the GMR.

Table 3.4: Aircraft - fuel storage and transfer activity data during 2003 in the GMR

Airport	Avtur Consumption (litres/year)	Avgas Consumption (litres/year)	Evaporative VOC Emissions (kg/year)	Data Source
Albion Park	-	23,000	0.24	(Shell, 2005)
Bankstown	5,820,420	5,689,464	5,780	(BP, 2005; Mobil, 2005; & Shell, 2005)
Camden	71,009	462,043	390	(BP, 2005; Mobil, 2005; & Shell, 2005)
Cessnock	123,000	117,000	71	(Shell, 2005)
Sydney	1,920,297,489	693,000	88.4	(BP, 2005 & Shell, 2005)
Williamtown	4,195,986	79,331	250	(BP, 2005 & Caltex, 2005)
Total	1,930,507,904	7,063,838	6,580	(BP, 2005; Caltex, 2005; Mobil, 2005; & Shell, 2005)

3.1.4 Emission and Speciation Factors

The emission and speciation factors for all substances from aircraft are detailed in Table 3.5.

Table 3.5: Emission and speciation factors for all substances from aircraft

Substance	Activity/Fuel Type		Emission Factor Source
CO, NO_x[1], SO_2 & Total VOC	Aircraft LTO		(FAA, 2004)
	APU & GSE	4-stroke petrol & Diesel	(FAA, 2004)
	Engine testing		(FAA, 2004)
	Fuel storage and transfer		(BP, 2005), (Caltex, 2005), (Mobil, 2005) & (Shell, 2005)
$PM_{2.5}$, PM_{10} & TSP	Aircraft LTO		(USEPA, 2004a & USEPA, 2004b), Appendix A (ERG, 2003) & (Klimont et. al., 2002)
	APU & GSE	4-stroke petrol	(FAA, 2004), (FAA, 2004) & (Norbeck et. al., 1998)
		Diesel	(FAA, 2004), (FAA, 2004) & (Klimont et. al., 2002)
	Engine testing		(USEPA, 2004a & USEPA, 2004b), Appendix A (ERG, 2003) & (Klimont et. al., 2002)
	Fuel storage and transfer		NA
Organic air toxics	Aircraft LTO		Appendix A (ERG, 2003)
	APU & GSE	4-stroke petrol	Appendix D (ERG, 2003)
		Diesel	(Pechan, 2006) replacing Profile Number 1201 (USEPA, 2002)
	Engine testing		Appendix A (ERG, 2003)
	Fuel storage and transfer		NA
Metal air toxics	Aircraft LTO		(Environment Australia, 2003)
	APU & GSE	4-stroke petrol	(Environment Australia, 2000)
		Diesel	(Environment Australia, 2000)
	Engine testing		(Environment Australia, 2003)
	Fuel storage and transfer		NA
PAH	Aircraft LTO		Appendix A (ERG, 2003)
	APU & GSE	4-stroke petrol & Diesel PM phase	Appendix D (ERG, 2003)
		4-stroke petrol & Diesel VOC phase	(Khalili et. al., 1995)
	Engine testing		Appendix A (ERG, 2003)
	Fuel storage and transfer		NA
PCDD/PCDF	Aircraft LTO		NA
	APU & GSE	4-stroke petrol & Diesel	Appendix D (ERG, 2003)
	Engine testing		NA
	Fuel storage and transfer		NA
Speciated VOC & Methane	Aircraft LTO	Commercial aviation	Profile Number 1098 (USEPA, 2002)
		General aviation	Profile Number 1099 (USEPA, 2002)
		Military aviation	Profile Number 1097 (USEPA, 2002)
	APU & GSE	4-stroke petrol [2]	Profile Number 1186 (USEPA, 2002)
		Diesel	(Pechan, 2006) replacing Profile Number 1201 (USEPA, 2002)
	Engine testing		Profile Number 1098 (USEPA, 2002)
	Fuel storage and transfer		Profile Number 0100 (USEPA, 2002)

[1] The default NO_x speciation profile used in the inventory is 5% NO_2 and 95% NO (USEPA, 2005a).
[2] Profile Number 0000 (USEPA, 2002) for "Unidentified" VOC.

3.1.5 Spatial Distribution of Emissions

Emissions from aircraft have been spatially distributed according to airport location, flight paths and ground movements (Environment Australia, 2003). Total emissions of each substance have been spatially distributed to each 1 km by 1 km grid cell in proportion to the various modes of operation (i.e. approach, taxi/idle, takeoff and climbout (LTO cycle)), flight paths and associated ground movements that occur in each grid cell. Figure 3.1 shows the spatial distribution of aircraft in the GMR.

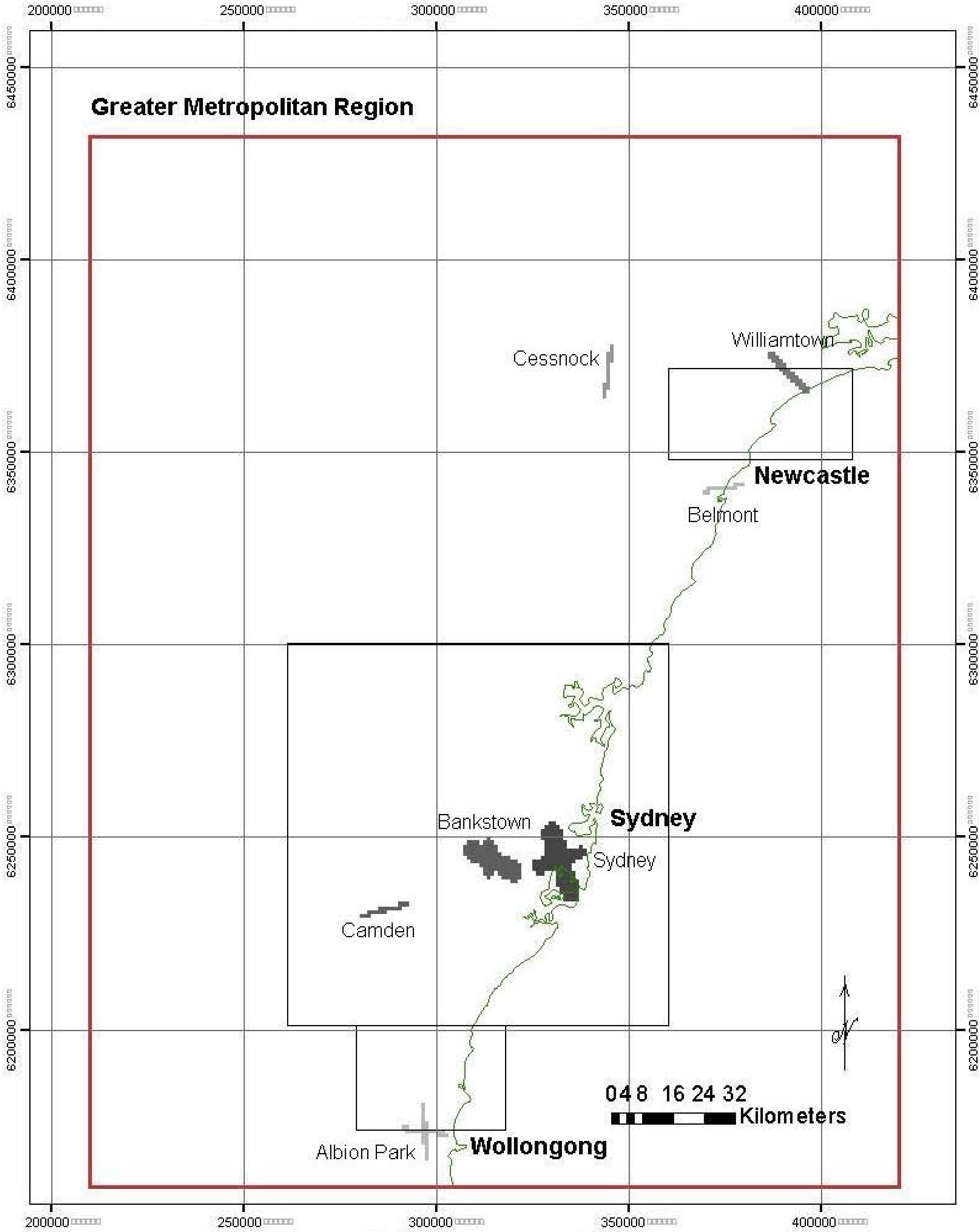

Figure 3.1: Spatial distribution of aircraft in the GMR

3.1.6 Temporal Variation of Emissions

The following temporal emissions variation profiles have been used for aircraft:

- Monthly - assumed to vary for each month of the year (AirServices Australia, 2005 & DOTARS, 2005);
- Weekly (i.e. Weekday and Weekend day) - assumed to be ~1.18 times higher on weekdays compared with weekend days (AirServices Australia, 2005 & DOTARS, 2005); and
- Daily – assumed to vary for each hour of the day (AirServices Australia, 2005 & DOTARS, 2005).

Tables 3.6, 3.7 and 3.8 detail the temporal emissions variation profiles that have been used for aircraft.

Table 3.6: Monthly temporal emissions variation profile for aircraft

Month	Monthly Temporal Factor		Month	Monthly Temporal Factor	
January	1.04	8.20%	July	1.06	8.37%
February	1.02	8.04%	August	1.08	8.53%
March	1.18	9.27%	September	1.04	8.20%
April	1.08	8.53%	October	1.04	8.20%
May	1.05	8.29%	November	1.00	7.88%
June	1.03	8.12%	December	1.06	8.37%

The monthly temporal emissions variation profile describes the distribution of annual emissions during each month. The temporal factors used in the monthly profile are scalar factors representing the ratio of emissions that occur in one month as opposed to another month.

Table 3.7: Weekly temporal emissions variation profile for aircraft

Day Type	Weekly Temporal Factor		Day Type	Weekly Temporal Factor	
Weekday	5.0	74.59%	Weekend day	1.7	25.41%

The weekly temporal variation emissions profile describes the distribution of annual emissions over a period of a week. The temporal factors used in the weekly profile are scalar factors representing the ratio of emissions that occur in one day type as opposed to another day type.

Table 3.8: Daily temporal emissions variation profile for aircraft

Hour	Weekday Temporal Factor		Weekend day Temporal Factor		Hour	Weekday Temporal Factor		Weekend day Temporal Factor	
1 am	0.150	0.25%	0.150	0.25%	1 pm	4.198	7.05%	4.198	7.05%
2 am	0.143	0.24%	0.143	0.24%	2 pm	4.233	7.11%	4.233	7.11%
3 am	0.100	0.17%	0.100	0.17%	3 pm	4.407	7.40%	4.407	7.40%
4 am	0.131	0.22%	0.131	0.22%	4 pm	4.317	7.25%	4.317	7.25%
5 am	0.305	0.51%	0.305	0.51%	5 pm	3.383	5.68%	3.383	5.68%
6 am	1.867	3.14%	1.867	3.14%	6 pm	3.229	5.42%	3.229	5.42%
7 am	2.998	5.04%	2.998	5.04%	7 pm	2.469	4.15%	2.469	4.15%
8 am	3.783	6.36%	3.783	6.36%	8 pm	1.907	3.20%	1.907	3.20%
9 am	4.857	8.16%	4.857	8.16%	9 pm	1.031	1.73%	1.031	1.73%
10 am	5.502	9.24%	5.502	9.24%	10 pm	0.648	1.09%	0.648	1.09%
11 am	4.745	7.97%	4.745	7.97%	11 pm	0.226	0.38%	0.226	0.38%
12 noon	4.712	7.92%	4.712	7.92%	12 midnight	0.186	0.31%	0.186	0.31%

The daily temporal emissions variation profile describes the distribution of daily emissions that occur during each hour for a typical weekday and a typical weekend day. The temporal factors used in the daily profile are scalar factors representing the ratio of emissions that occur in one hour as opposed to another hour.

3.1.7 Emission Estimates

Table 3.9 presents total estimated annual emissions (for selected substances) from aircraft for the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions. Total estimated annual emissions of all substances from aircraft are presented in Appendix C.

Table 3.9: Total estimated annual emissions from aircraft in each region

Substance	Emissions (tonnes/year)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	7.63	5.55×10^{-01}	6.82×10^{-03}	9.72×10^{-02}	8.29
ACETALDEHYDE	$5.76 \times 10^{+01}$	2.46	1.54×10^{-02}	7.52×10^{-01}	$6.08 \times 10^{+01}$
BENZENE	$1.53 \times 10^{+01}$	9.13×10^{-01}	1.18×10^{-02}	2.30×10^{-01}	$1.65 \times 10^{+01}$
CARBON MONOXIDE	$9.98 \times 10^{+03}$	$3.18 \times 10^{+02}$	7.77	$1.84 \times 10^{+02}$	$1.05 \times 10^{+04}$
FORMALDEHYDE	$7.62 \times 10^{+01}$	4.86	4.91×10^{-02}	9.31×10^{-01}	$8.21 \times 10^{+01}$
ISOMERS OF XYLENE	$1.28 \times 10^{+01}$	6.53×10^{-01}	1.01×10^{-02}	2.25×10^{-01}	$1.37 \times 10^{+01}$
LEAD AND COMPOUNDS	3.01×10^{-01}	1.12×10^{-02}	3.63×10^{-04}	1.20×10^{-02}	3.24×10^{-01}
OXIDES OF NITROGEN	$3.22 \times 10^{+03}$	$3.62 \times 10^{+01}$	5.62×10^{-01}	$1.23 \times 10^{+01}$	$3.27 \times 10^{+03}$
PARTICULATE MATTER < 10 µm	$8.62 \times 10^{+01}$	2.98	1.51×10^{-01}	3.13	$9.25 \times 10^{+01}$
PARTICULATE MATTER < 2.5 µm	$8.00 \times 10^{+01}$	2.76	1.39×10^{-01}	2.89	$8.58 \times 10^{+01}$
POLYCYCLIC AROMATIC HYDROCARBONS	$1.76 \times 10^{+01}$	5.49×10^{-01}	1.56×10^{-02}	4.06×10^{-01}	$1.86 \times 10^{+01}$
SULFUR DIOXIDE	$2.35 \times 10^{+02}$	3.64	4.37×10^{-02}	1.22	$2.40 \times 10^{+02}$
TETRACHLOROETHYLENE	2.99×10^{-02}	8.51×10^{-04}	4.14×10^{-07}	4.10×10^{-04}	3.12×10^{-02}
TOLUENE	$1.62 \times 10^{+01}$	9.19×10^{-01}	1.69×10^{-02}	3.13×10^{-01}	$1.74 \times 10^{+01}$
TOTAL SUSPENDED PARTICULATES	$9.08 \times 10^{+01}$	3.14	1.58×10^{-01}	3.29	$9.74 \times 10^{+01}$
TOTAL VOCS	$6.21 \times 10^{+02}$	$3.65 \times 10^{+01}$	4.08×10^{-01}	8.52	$6.66 \times 10^{+02}$
TRICHLOROETHYLENE	1.84×10^{-02}	5.23×10^{-04}	2.54×10^{-07}	2.52×10^{-04}	1.92×10^{-02}

Table 3.10 presents total estimated annual emissions (for some criteria pollutants only) from each airport in the GMR.

Table 3.10: Total estimated annual emissions from each airport

Airport	Region	Activity	Emissions (tonnes/year)				
			CARBON MONOXIDE	OXIDES OF NITROGEN	PARTICULATE MATTER < 10 µm	SULFUR DIOXIDE	TOTAL VOCS
Albion Park	Wollongong	Aircraft LTO	7.70	5.47×10^{-01}	1.50×10^{-01}	4.16×10^{-02}	4.04×10^{-01}
		APU & GSE	7.54×10^{-02}	1.58×10^{-02}	5.89×10^{-04}	2.09×10^{-03}	3.59×10^{-03}
		Fuel storage and transfer	-	-	-	-	2.40×10^{-04}
		Subtotal	7.77	5.62×10^{-01}	1.51×10^{-01}	4.37×10^{-02}	4.08×10^{-01}
Bankstown	Sydney	Aircraft LTO	$1.12 \times 10^{+03}$	7.94	$1.84 \times 10^{+01}$	1.01	$5.37 \times 10^{+01}$
		APU & GSE	$7.80 \times 10^{+01}$	$1.33 \times 10^{+01}$	6.60×10^{-01}	1.51	3.62
		Fuel storage and transfer	-	-	-	-	5.78
		Subtotal	$1.20 \times 10^{+03}$	$2.12 \times 10^{+01}$	$1.91 \times 10^{+01}$	2.51	$6.31 \times 10^{+01}$
Belmont	Non-Urban	Aircraft LTO	8.15	1.94	1.43	3.75×10^{-01}	6.81×10^{-01}
		APU & GSE	$9.43 \times 10^{+01}$	4.45	1.30×10^{-01}	3.86×10^{-01}	3.52
		Subtotal	$1.02 \times 10^{+02}$	6.39	1.56	7.61×10^{-01}	4.20
Camden	Sydney	Aircraft LTO	$1.78 \times 10^{+02}$	$1.27 \times 10^{+01}$	3.48	9.65×10^{-01}	9.36
		APU & GSE	1.75	3.67×10^{-01}	1.36×10^{-02}	4.84×10^{-02}	8.31×10^{-02}
		Fuel storage and transfer	-	-	-	-	3.90×10^{-01}
		Subtotal	$1.80 \times 10^{+02}$	$1.30 \times 10^{+01}$	3.49	1.01	9.83
Cessnock	Non-Urban	Aircraft LTO	$8.03 \times 10^{+01}$	5.70	1.56	4.34×10^{-01}	4.21
		APU & GSE	7.87×10^{-01}	1.65×10^{-01}	6.14×10^{-03}	2.18×10^{-02}	3.74×10^{-02}
		Fuel storage and transfer	-	-	-	-	7.10×10^{-02}
		Subtotal	$8.11 \times 10^{+01}$	5.87	1.57	4.56×10^{-01}	4.32
Sydney	Sydney	Aircraft LTO	$1.91 \times 10^{+03}$	$2.62 \times 10^{+03}$	$4.97 \times 10^{+01}$	$1.84 \times 10^{+02}$	$2.91 \times 10^{+02}$
		APU & GSE	$6.69 \times 10^{+03}$	$4.25 \times 10^{+02}$	$1.40 \times 10^{+01}$	$4.37 \times 10^{+01}$	$2.55 \times 10^{+02}$
		Fuel storage and transfer	-	-	-	-	8.84×10^{-02}
		Engine testing	1.25	$1.41 \times 10^{+02}$	-	3.26	1.03
		Subtotal	$8.60 \times 10^{+03}$	$3.18 \times 10^{+03}$	$6.37 \times 10^{+01}$	$2.31 \times 10^{+02}$	$5.48 \times 10^{+02}$
Williamtown	Newcastle	Aircraft LTO	$1.25 \times 10^{+02}$	$2.48 \times 10^{+01}$	2.58	2.58	$2.89 \times 10^{+01}$
		APU & GSE	$1.93 \times 10^{+02}$	$1.14 \times 10^{+01}$	4.04×10^{-01}	1.06	7.37
		Fuel storage and transfer	-	-	-	-	2.50×10^{-01}
		Subtotal	$3.18 \times 10^{+02}$	$3.62 \times 10^{+01}$	2.98	3.64	$3.65 \times 10^{+01}$
Total Aircraft LTO, APU & GSE, Fuel storage and transfer and Engine testing in the GMR			$1.05 \times 10^{+04}$	$3.27 \times 10^{+03}$	$9.25 \times 10^{+01}$	$2.40 \times 10^{+02}$	$6.66 \times 10^{+02}$

Tables 3.11, 3.12, 3.13 and 3.14 present total estimated daily emissions (for selected substances) from aircraft for the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions. These estimates are representative of typical January weekday, January weekend day, July weekday and July weekend day daily emissions.

Table 3.11: Total estimated daily emissions from aircraft in each region for typical January weekday

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	2.03×10^{-02}	1.48×10^{-03}	1.82×10^{-05}	2.59×10^{-04}	2.21×10^{-02}
ACETALDEHYDE	1.53×10^{-01}	6.55×10^{-03}	4.09×10^{-05}	2.00×10^{-03}	1.62×10^{-01}
BENZENE	4.08×10^{-02}	2.43×10^{-03}	3.14×10^{-05}	6.12×10^{-04}	4.39×10^{-02}
CARBON MONOXIDE	$2.66 \times 10^{+01}$	8.47×10^{-01}	2.07×10^{-02}	4.88×10^{-01}	$2.79 \times 10^{+01}$
FORMALDEHYDE	2.03×10^{-01}	1.29×10^{-02}	1.31×10^{-04}	2.48×10^{-03}	2.18×10^{-01}
ISOMERS OF XYLENE	3.40×10^{-02}	1.74×10^{-03}	2.69×10^{-05}	5.99×10^{-04}	3.64×10^{-02}
LEAD AND COMPOUNDS	8.01×10^{-04}	2.99×10^{-05}	9.66×10^{-07}	3.19×10^{-05}	8.63×10^{-04}
OXIDES OF NITROGEN	8.56	9.63×10^{-02}	1.50×10^{-03}	3.26×10^{-02}	8.69
PARTICULATE MATTER < 10 µm	2.29×10^{-01}	7.93×10^{-03}	4.01×10^{-04}	8.33×10^{-03}	2.46×10^{-01}
PARTICULATE MATTER < 2.5 µm	2.13×10^{-01}	7.34×10^{-03}	3.69×10^{-04}	7.68×10^{-03}	2.28×10^{-01}
POLYCYCLIC AROMATIC HYDROCARBONS	4.68×10^{-02}	1.46×10^{-03}	4.14×10^{-05}	1.08×10^{-03}	4.94×10^{-02}
SULFUR DIOXIDE	6.24×10^{-01}	9.68×10^{-03}	1.16×10^{-04}	3.24×10^{-03}	6.37×10^{-01}
TETRACHLOROETHYLENE	7.96×10^{-05}	2.26×10^{-06}	1.10×10^{-09}	1.09×10^{-06}	8.30×10^{-05}
TOLUENE	4.31×10^{-02}	2.45×10^{-03}	4.49×10^{-05}	8.34×10^{-04}	4.64×10^{-02}
TOTAL SUSPENDED PARTICULATES	2.42×10^{-01}	8.35×10^{-03}	4.22×10^{-04}	8.76×10^{-03}	2.59×10^{-01}
TOTAL VOCS	1.65	9.72×10^{-02}	1.08×10^{-03}	2.27×10^{-02}	1.77
TRICHLOROETHYLENE	4.89×10^{-05}	1.39×10^{-06}	6.77×10^{-10}	6.71×10^{-07}	5.10×10^{-05}

Table 3.12: Total estimated daily emissions from aircraft in each region for typical January weekend day

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	1.99×10^{-02}	1.45×10^{-03}	1.78×10^{-05}	2.53×10^{-04}	2.16×10^{-02}
ACETALDEHYDE	1.50×10^{-01}	6.41×10^{-03}	4.01×10^{-05}	1.96×10^{-03}	1.58×10^{-01}
BENZENE	4.00×10^{-02}	2.38×10^{-03}	3.08×10^{-05}	5.99×10^{-04}	4.30×10^{-02}
CARBON MONOXIDE	$2.60 \times 10^{+01}$	8.29×10^{-01}	2.03×10^{-02}	4.78×10^{-01}	$2.73 \times 10^{+01}$
FORMALDEHYDE	1.99×10^{-01}	1.27×10^{-02}	1.28×10^{-04}	2.42×10^{-03}	2.14×10^{-01}
ISOMERS OF XYLENE	3.33×10^{-02}	1.70×10^{-03}	2.63×10^{-05}	5.86×10^{-04}	3.56×10^{-02}
LEAD AND COMPOUNDS	7.84×10^{-04}	2.92×10^{-05}	9.46×10^{-07}	3.13×10^{-05}	8.45×10^{-04}
OXIDES OF NITROGEN	8.38	9.43×10^{-02}	1.47×10^{-03}	3.19×10^{-02}	8.51
PARTICULATE MATTER < 10 µm	2.25×10^{-01}	7.76×10^{-03}	3.92×10^{-04}	8.15×10^{-03}	2.41×10^{-01}
PARTICULATE MATTER < 2.5 µm	2.08×10^{-01}	7.19×10^{-03}	3.61×10^{-04}	7.52×10^{-03}	2.23×10^{-01}
POLYCYCLIC AROMATIC HYDROCARBONS	4.59×10^{-02}	1.43×10^{-03}	4.05×10^{-05}	1.06×10^{-03}	4.84×10^{-02}
SULFUR DIOXIDE	6.11×10^{-01}	9.48×10^{-03}	1.14×10^{-04}	3.17×10^{-03}	6.24×10^{-01}
TETRACHLOROETHYLENE	7.80×10^{-05}	2.22×10^{-06}	1.08×10^{-09}	1.07×10^{-06}	8.13×10^{-05}
TOLUENE	4.22×10^{-02}	2.39×10^{-03}	4.40×10^{-05}	8.16×10^{-04}	4.54×10^{-02}
TOTAL SUSPENDED PARTICULATES	2.36×10^{-01}	8.17×10^{-03}	4.13×10^{-04}	8.58×10^{-03}	2.54×10^{-01}
TOTAL VOCS	1.62	9.52×10^{-02}	1.06×10^{-03}	2.22×10^{-02}	1.74
TRICHLOROETHYLENE	4.79×10^{-05}	1.36×10^{-06}	6.63×10^{-10}	6.57×10^{-07}	4.99×10^{-05}

Table 3.13: Total estimated daily emissions from aircraft in each region for typical July weekday

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	2.07×10^{-02}	1.51×10^{-03}	1.85×10^{-05}	2.64×10^{-04}	2.25×10^{-02}
ACETALDEHYDE	1.56×10^{-01}	6.68×10^{-03}	4.17×10^{-05}	2.04×10^{-03}	1.65×10^{-01}
BENZENE	4.16×10^{-02}	2.48×10^{-03}	3.20×10^{-05}	6.24×10^{-04}	4.48×10^{-02}
CARBON MONOXIDE	$2.71 \times 10^{+01}$	8.64×10^{-01}	2.11×10^{-02}	4.98×10^{-01}	$2.85 \times 10^{+01}$
FORMALDEHYDE	2.07×10^{-01}	1.32×10^{-02}	1.33×10^{-04}	2.53×10^{-03}	2.23×10^{-01}
ISOMERS OF XYLENE	3.47×10^{-02}	1.77×10^{-03}	2.74×10^{-05}	6.11×10^{-04}	3.71×10^{-02}
LEAD AND COMPOUNDS	8.17×10^{-04}	3.05×10^{-05}	9.86×10^{-07}	3.26×10^{-05}	8.81×10^{-04}
OXIDES OF NITROGEN	8.73	9.82×10^{-02}	1.53×10^{-03}	3.33×10^{-02}	8.87
PARTICULATE MATTER < 10 µm	2.34×10^{-01}	8.09×10^{-03}	4.09×10^{-04}	8.49×10^{-03}	2.51×10^{-01}
PARTICULATE MATTER < 2.5 µm	2.17×10^{-01}	7.49×10^{-03}	3.76×10^{-04}	7.83×10^{-03}	2.33×10^{-01}
POLYCYCLIC AROMATIC HYDROCARBONS	4.78×10^{-02}	1.49×10^{-03}	4.22×10^{-05}	1.10×10^{-03}	5.04×10^{-02}
SULFUR DIOXIDE	6.37×10^{-01}	9.88×10^{-03}	1.19×10^{-04}	3.30×10^{-03}	6.50×10^{-01}
TETRACHLOROETHYLENE	8.12×10^{-05}	2.31×10^{-06}	1.12×10^{-09}	1.11×10^{-06}	8.47×10^{-05}
TOLUENE	4.39×10^{-02}	2.49×10^{-03}	4.58×10^{-05}	8.50×10^{-04}	4.73×10^{-02}
TOTAL SUSPENDED PARTICULATES	2.46×10^{-01}	8.51×10^{-03}	4.30×10^{-04}	8.94×10^{-03}	2.64×10^{-01}
TOTAL VOCS	1.68	9.91×10^{-02}	1.11×10^{-03}	2.31×10^{-02}	1.81
TRICHLOROETHYLENE	4.99×10^{-05}	1.42×10^{-06}	6.90×10^{-10}	6.84×10^{-07}	5.20×10^{-05}

Table 3.14: Total estimated daily emissions from aircraft in each region for typical July weekend day

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	2.03×10^{-02}	1.47×10^{-03}	1.81×10^{-05}	2.58×10^{-04}	2.20×10^{-02}
ACETALDEHYDE	1.53×10^{-01}	6.54×10^{-03}	4.09×10^{-05}	2.00×10^{-03}	1.62×10^{-01}
BENZENE	4.08×10^{-02}	2.43×10^{-03}	3.14×10^{-05}	6.11×10^{-04}	4.38×10^{-02}
CARBON MONOXIDE	$2.65 \times 10^{+01}$	8.46×10^{-01}	2.07×10^{-02}	4.88×10^{-01}	$2.79 \times 10^{+01}$
FORMALDEHYDE	2.03×10^{-01}	1.29×10^{-02}	1.31×10^{-04}	2.47×10^{-03}	2.18×10^{-01}
ISOMERS OF XYLENE	3.40×10^{-02}	1.73×10^{-03}	2.69×10^{-05}	5.98×10^{-04}	3.63×10^{-02}
LEAD AND COMPOUNDS	8.00×10^{-04}	2.98×10^{-05}	9.65×10^{-07}	3.19×10^{-05}	8.62×10^{-04}
OXIDES OF NITROGEN	8.55	9.62×10^{-02}	1.49×10^{-03}	3.26×10^{-02}	8.68
PARTICULATE MATTER < 10 µm	2.29×10^{-01}	7.92×10^{-03}	4.00×10^{-04}	8.32×10^{-03}	2.46×10^{-01}
PARTICULATE MATTER < 2.5 µm	2.13×10^{-01}	7.33×10^{-03}	3.68×10^{-04}	7.67×10^{-03}	2.28×10^{-01}
POLYCYCLIC AROMATIC HYDROCARBONS	4.68×10^{-02}	1.46×10^{-03}	4.13×10^{-05}	1.08×10^{-03}	4.94×10^{-02}
SULFUR DIOXIDE	6.24×10^{-01}	9.67×10^{-03}	1.16×10^{-04}	3.23×10^{-03}	6.37×10^{-01}
TETRACHLOROETHYLENE	7.95×10^{-05}	2.26×10^{-06}	1.10×10^{-09}	1.09×10^{-06}	8.29×10^{-05}
TOLUENE	4.30×10^{-02}	2.44×10^{-03}	4.48×10^{-05}	8.33×10^{-04}	4.63×10^{-02}
TOTAL SUSPENDED PARTICULATES	2.41×10^{-01}	8.34×10^{-03}	4.21×10^{-04}	8.75×10^{-03}	2.59×10^{-01}
TOTAL VOCS	1.65	9.71×10^{-02}	1.08×10^{-03}	2.26×10^{-02}	1.77
TRICHLOROETHYLENE	4.89×10^{-05}	1.39×10^{-06}	6.76×10^{-10}	6.70×10^{-07}	5.09×10^{-05}

3.1.8 Emission Projection Methodology

Emission projection factors for aircraft use total air transport oil consumption growth as the surrogate. Emission projection factors for aircraft have been developed using the following data:

- Total air transport oil consumption growth data (ABARE, 2005b).

Emission projection factors have been developed for every year from 2004 to 2031 (emissions for the base year 2003 are based on the activity data obtained coupled with the emission estimation techniques). Table 3.15 presents the emission projection factors for aircraft.

Table 3.15: Emission projection factors for aircraft

Year	Emission Projection Factors [1]	Year	Emission Projection Factors [1]
2004	1.0420	2018	1.8525
2005	1.0857	2019	1.9302
2006	1.1312	2020	2.0112
2007	1.1787	2021	2.0955
2008	1.2281	2022	2.1835
2009	1.2797	2023	2.2751
2010	1.3334	2024	2.3705
2011	1.3893	2025	2.4700
2012	1.4476	2026	2.5736
2013	1.5083	2027	2.6816
2014	1.5716	2028	2.7941
2015	1.6376	2029	2.9114
2016	1.7063	2030	3.0335
2017	1.7779	2031	3.1608

[1] Data Source: (ABARE, 2005b), http://www.abareconomics.com/data_services/excel/TPEC 05.xls?prodid=13183.

3.2 Commercial Boats

3.2.1 Emission Source Description

Emissions of combustion products from commercial boats arise from inboard and outboard 2-stroke and 4-stroke petrol engines and diesel engines used in waterways for various purposes. The off-road mobile air emissions inventory includes the following types of commercial boats:

- Ferries;
- Licensed fishing vessels; and
- Other commercial boats:
  - Barges;
  - Charter or hire vessels – e.g. diving, fishing, houseboats, paraflying, passenger, sailing or tourism;
  - Rescue boats;
  - Sailing school vessels;
  - Small cargo vessels;
  - Tug boats;
  - Vehicular and passenger ferries;
  - Water taxis; and
  - Work boats.

Emissions from commercial ships and recreational boats have been separately estimated for the entire GMR and the results are presented in Sections 3.4 and 3.9 respectively.

3.2.2 Emission Estimation Methodology

Emissions from commercial boats have been estimated using the NONROAD2005 Model (USEPA, 2005e), which requires boat type, fuel type, operating hours and area of operation data to be obtained from maritime authorities. Operating hours data for each boat and fuel type have been combined with time based emission factors to estimate emissions for each substance. The NONROAD2005 Model estimates emissions for each specific type of commercial boat using the following input data estimates:

- Boat population for base year, distributed by age, power, fuel type, and application;
- Average load factor expressed as average fraction of available power;
- Available power in horsepower;
- Activity in hours of use per year; and
- Emission factor with deterioration and/or new standards.

Emissions from commercial boats have been calculated using the following formula:

$$E_{i,j,k} = EF_{i,j,k} \times SF_{i,j,k} \times OT_{j,k} \times N_{j,k} \text{ x } LF_{j,k}$$

where:

$E_{i,j,k}$	=	Emission of substance i from fuel type j and commercial boat type k	(kg/year)
$EF_{i,j,k}$	=	Time based emission factor of substance i for fuel type j and commercial boat type k	(kg/hr)
$SF_{i,j,k}$	=	NO_x, VOC or PM speciation factor of substance i for fuel type j and commercial boat type k	(%)
$OT_{j,k}$	=	Operating time for fuel type j and commercial boat type k	(hr/year)
$N_{j,k}$	=	Number with fuel type j and commercial boat type k	(Number)
$LF_{j,k}$	=	Load factor for fuel type j and commercial boat type k	(%)

3.2.3 Activity Data

Activity data required for estimating emissions from commercial boats includes:

- **Ferries**
  - Area of operation for ferries (SFC, 2005a);
  - Ferry population, engine power and fuel type (SFC, 2005b & SFC, 2005c);
  - Average load factor expressed as average fraction of available power (USEPA, 2004c); and
  - Activity in hours of use per year (SFC, 2005a).

Table 3.16 includes the vessel type, fuel type, engine power range, number of vessels and hours of use per year for ferries in the GMR. These ferries all operate in the Sydney region.

Table 3.16: Commercial boats – ferries activity data during 2003 in the GMR

Vessel Type [1]	Engine Power Range (kW) [1]	Number of Diesel Vessels [1]	Total Usage (hours/year) [1]
HarbourCats	224 to 447	2	6,910
SuperCats	2,237 to 7,456	4	23,133
Freshwater Class	1,491 to 2,237	4	23,816
JetCats	1,491 to 2,237	3	6,084
Lady Class	224 to 447	2	8,757
First Fleet Class	224 to 447	9	54,619
RiverCats	224 to 447	7	19,660
Total Ferries		31	142,979

[1] Data Source: (SFC, 2005a; SFC, 2005b & SFC, 2005c).

- **Licensed fishing vessels**
  - Area of operation for licensed fishing vessels (NSW DPI, 2005);
  - Licensed fishing vessel population, engine power and fuel type (NSW DPI, 2005);
  - Average load factor expressed as average fraction of available power (USEPA, 2004c); and
  - Activity in hours of use per year (NSW DPI, 2005).

Table 3.17 includes the total fishing days by area and average hours of use per year for licensed fishing vessels in the GMR.

Table 3.17: Commercial boats – total fishing days by area and average hours of use for licensed fishing vessels during 2003 in the GMR

Total Fishing Days by Area [1]							Average Usage (hours/year) [1]
Central Coast Estuary	Newcastle Estuary	Sydney Estuary	Wollongong Estuary	Newcastle Ocean	Sydney Ocean	Wollongong Ocean	
8,364	17,515	1,719	1,951	8,900	6,720	5,193	250

[1] Data Source: (NSW DPI, 2005).

Figure 3.2 shows the proportion of total fishing days by area for licensed fishing vessels in the GMR.

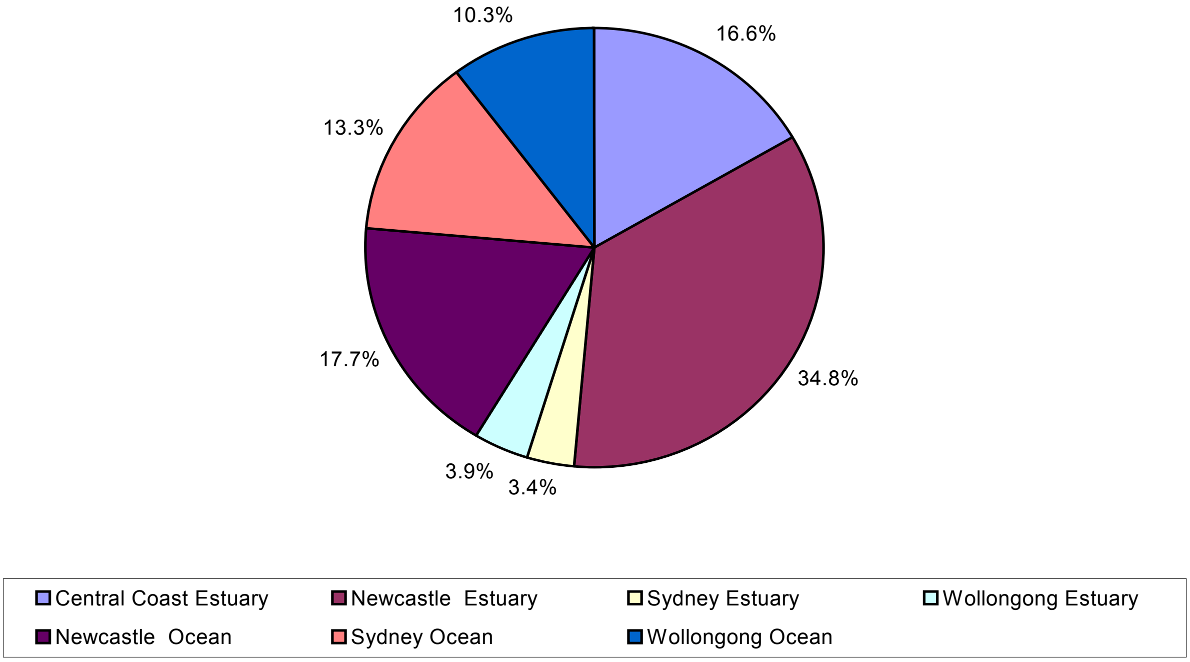

Figure 3.2: Proportion of total fishing days by area for licensed fishing vessels during 2003 in the GMR

Table 3.18 includes the number of vessels with a given fuel type and engine power range for licensed fishing vessels in the GMR.

Table 3.18: Commercial boats – fuel type and engine power for licensed fishing vessels during 2003 in the GMR

Engine Power Range (kW) [1]	Number of Diesel Licensed Fishing Vessels [1]	Number of Petrol Licensed Fishing Vessels [1,2]
< 50	74	2,095
50 to 99	486	382
100 to 149	430	73
150 to 199	352	-
200 to 299	267	-
300 to 500	107	-
Total Fuel Type	1,716	2,550
Total Licensed Fishing Vessels	4,266	

[1] Data Source: (NSW DPI, 2005).
[2] 50 % and 50 % of petrol engines are 2-stroke and 4-stroke respectively (NSW DPI, 2005).

Figure 3.3 shows the proportion of vessels with a given fuel type and engine power range for licensed fishing vessels in the GMR.

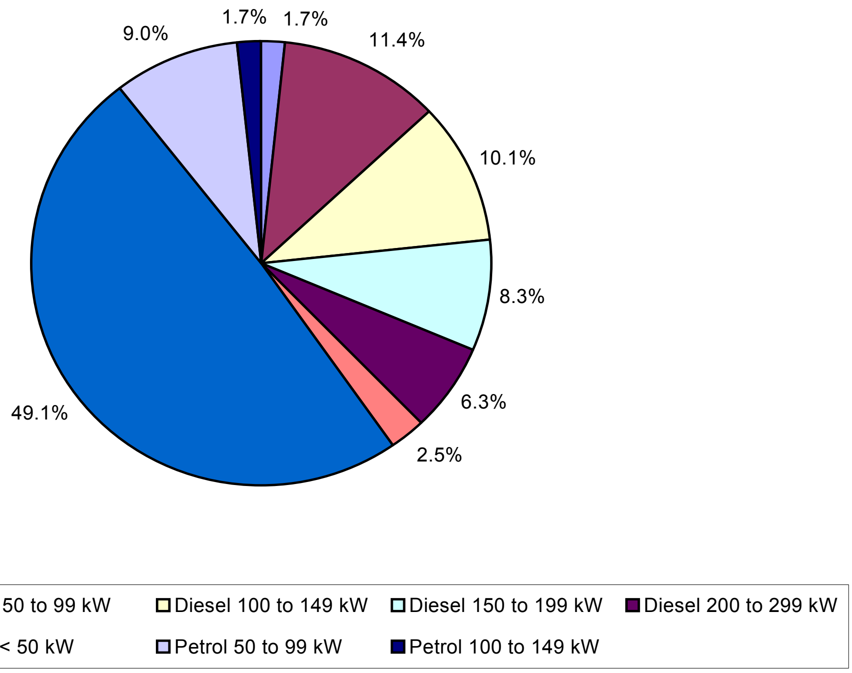

Figure 3.3: Proportion of fuel type and engine power range for licensed fishing vessels during 2003 in the GMR

❑ Other commercial boats

- Area of operation for other commercial boats (NSW Maritime Authority, 2005);
- Other commercial boat population, engine power and fuel type (NSW Maritime Authority, 2005);
- Average load factor expressed as average fraction of available power (USEPA, 2004c); and
- Activity in hours of use per year (Quan et. al., 2002).

Table 3.19 includes the area of use for other commercial boats in the GMR.

Table 3.19: Commercial boats – area of use for other commercial boats during 2003 in the GMR

Area of Use [1]	Number of Vessels [1]
Botany Bay/Georges River	59
Brisbane Water/Patonga	24
Hawkesbury River/Cowan Creek	85
Kiama	11
Lake Illawarra	1
Lake Macquarie Eastern	35
Lake Macquarie Western	23
Lemon Tree Passage	4
Pittwater	117
Port Hacking	43
Port Hunter	58
Port Jackson & Tributaries	564
Port Kembla	13
Shoal Bay to Soldier's Point	72
Stockton/Fern Bay	7
Tea Gardens/Hawks Nest	8
Terrigal	10
Tuggerah Lakes	9
Upper Hawkesbury River	45
Wollongong	23
Total Other Commercial Boats	1,211

[1] Data Source: (NSW Maritime Authority, 2005).

Figure 3.4 shows the proportion of area of use for other commercial boats in the GMR.

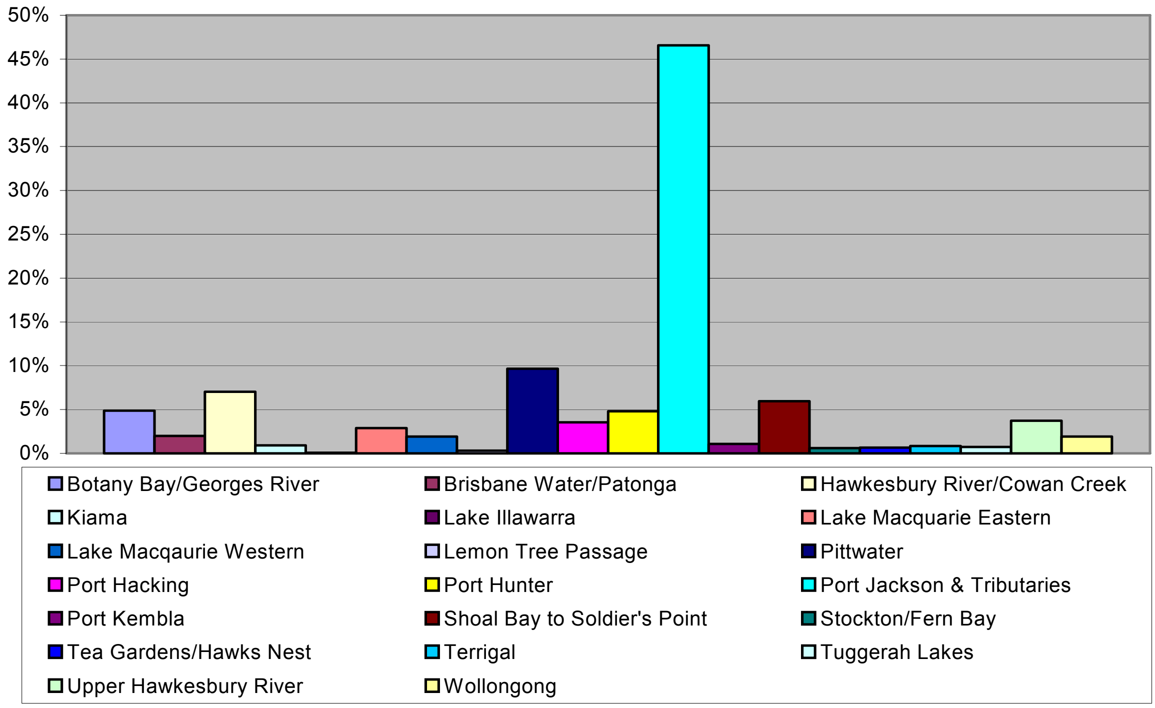

Figure 3.4: Proportion of area of use for other commercial boats during 2003 in the GMR

Table 3.20 includes the vessel type, number and total hours of use per year for other commercial boats in the GMR.

Table 3.20: Commercial boats – vessel type, number and total hours of use for other commercial boats during 2003 in the GMR

Vessel Type [1]	Number of Vessels [1]	Total Usage (hours/year) [2]
Cargo Vessel	3	5,000
Commercial Adventure/Tour Vessel	2	900
Crane Barge	9	2,500
Dive Charter	41	18,450
Fishing	86	38,700
Hire and Drive	142	63,900
Houseboat	35	15,750
Paraflying	2	900
Passenger Charter	522	236,250
Passenger Ferry	54	108,000
Rescue Vessel	2	4,000
Sail Charter	81	36,450
Tug Boat	28	112,000
Vehicular Ferry	2	4,000
Water Taxi	35	70,000
Workboat	164	328,000
Total Other Commercial Boats	1,211	1,044,800

[1] Data Source: (NSW Maritime Authority, 2005).
[2] Data Source: (Quan, et. al., 2002).

Figure 3.5 shows the proportion of vessel type for other commercial boats in the GMR.

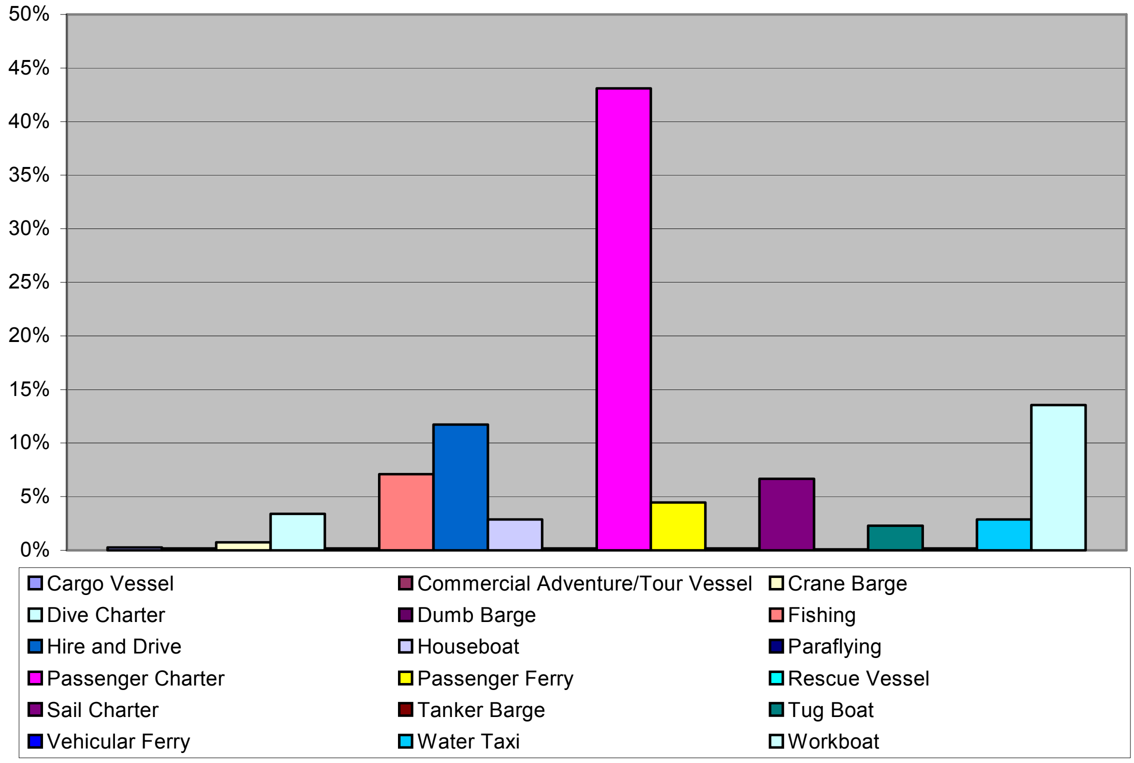

Figure 3.5: Proportion of vessel type for other commercial boats during 2003 in the GMR

Table 3.21 includes the number of vessels with a given fuel type and total and individual engine power range for other commercial boats in the GMR.

Table 3.21: Commercial boats – fuel type and total and individual engine power for other commercial boats during 2003 in the GMR

Engine Power Range (kW) [1]	Number of Diesel Vessels by Total Engine Power [1]	Number of Diesel Engines by Individual Engine Power [1]	Number of Petrol Vessels by Total Engine Power [1]	Number of Petrol Engines by Individual Engine Power [1,2]
< 50 kW	216	228	131	239
50 to 99 kW	129	198	49	165
100 to 149 kW	85	156	59	160
150 to 199 kW	74	146	126	36
200 to 299 kW	95	164	-	-
300 to 500 kW	109	164	-	-
> 500 kW	138	95	-	-
Total Fuel Type	846	1,151	365	600
Total Other Commercial Boats - Vessels	1,211			
Total Other Commercial Boats - Engines	1,751			

[1] Data Source: (NSW Maritime Authority, 2005).
[2] 96.7 % and 3.3 % of petrol engines are 2-stroke and 4-stroke respectively (NSW Maritime Authority, 2005).

Figure 3.6 shows the proportion of vessels and individual engines with a given fuel type and engine power range for other commercial boats in the GMR.

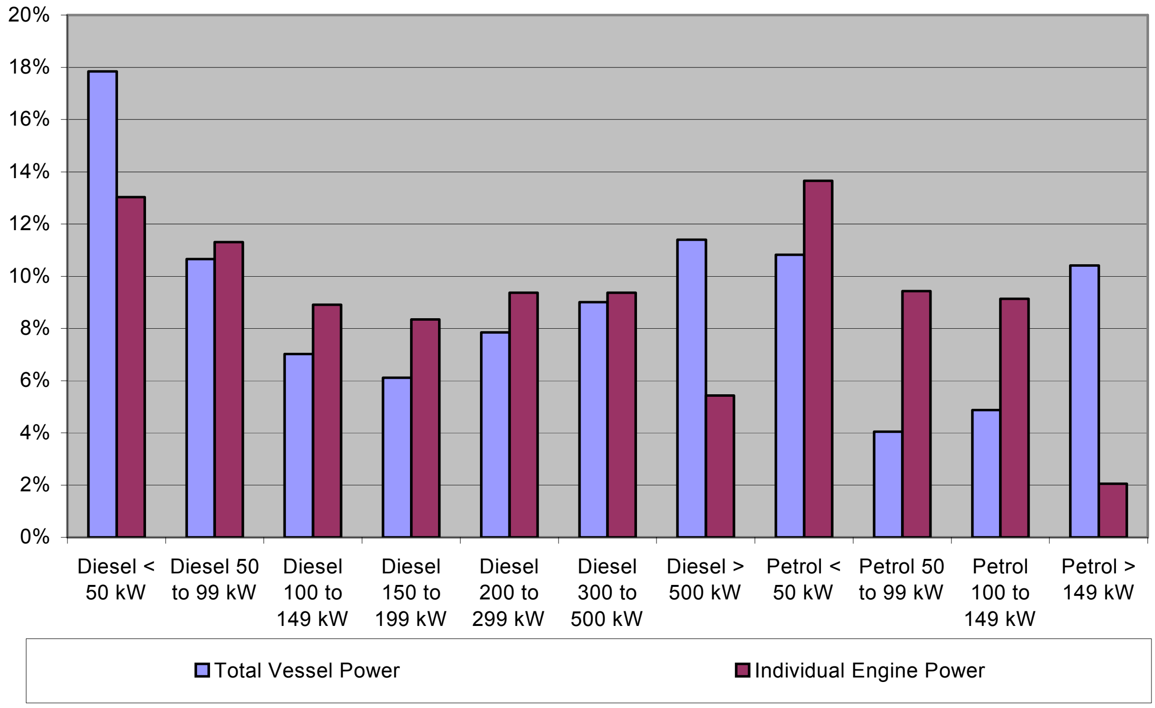

Figure 3.6: Proportion of vessels and individual engines fuel type and engine power range for other commercial boats during 2003 in the GMR

3.2.4 Emission and Speciation Factors

The emission and speciation factors for all substances from commercial boats are detailed in Table 3.22.

Table 3.22: Emission and speciation factors for all substances from commercial boats

Substance	Fuel Type		Emission Factor Source
CO, NO_x[1], PM_{10}, SO_2 & Total VOC	All		(USEPA, 2005e)
$PM_{2.5}$ & TSP	2-stroke & 4-stroke petrol		(USEPA, 2004a & USEPA, 2004b) & (Norbeck et. al., 1998)
	Diesel		(USEPA, 2005e) & (Klimont et. al., 2002)
Organic air toxics	2-stroke & 4-stroke petrol		Appendix D (ERG, 2003)
	Diesel		(Pechan, 2006) replacing Profile Number 1201 (USEPA, 2002)
Metal air toxics	All		(Environment Australia, 1999a)
PAH	All	PM phase	Appendix D (ERG, 2003)
		VOC phase	(Khalili et. al., 1995)
PCDD/PCDF	All		Appendix D (ERG, 2003)
Speciated VOC & Methane	2-stroke & 4-stroke petrol [2]		Profile Number 1203 (USEPA, 2002)
	Diesel		(Pechan, 2006) replacing Profile Number 1201 (USEPA, 2002)

[1] The default NO_x speciation profile used in the inventory is 5% NO_2 and 95% NO (USEPA, 2005a).
[2] Profile Number 0000 (USEPA, 2002) for "Unidentified" VOC.

3.2.5 Spatial Distribution of Emissions

Emissions from commercial boats have been spatially distributed according to:

- Ferries – Area of operation for ferries based on timetables, wharf locations and route maps (SFC, 2005a);
- Licensed fishing vessels – Area of operation for licensed fishing vessels based on the ComCatch and LobCatch databases (NSW DPI, 2005); and

- Other commercial boats - Area of operation for other commercial boats based on vessels that have Certificates of Survey within NSW data (NSW Maritime Authority, 2005).

Licensed fishing vessels and other commercial boats that operate in the ocean have been assumed to be within ~37 km from the coast. Total emissions of each substance have been spatially distributed to each 1 km by 1 km grid cell in proportion to the contribution of each vessel type in each grid cell. Figure 3.7 shows the spatial distribution of commercial boats in the GMR.

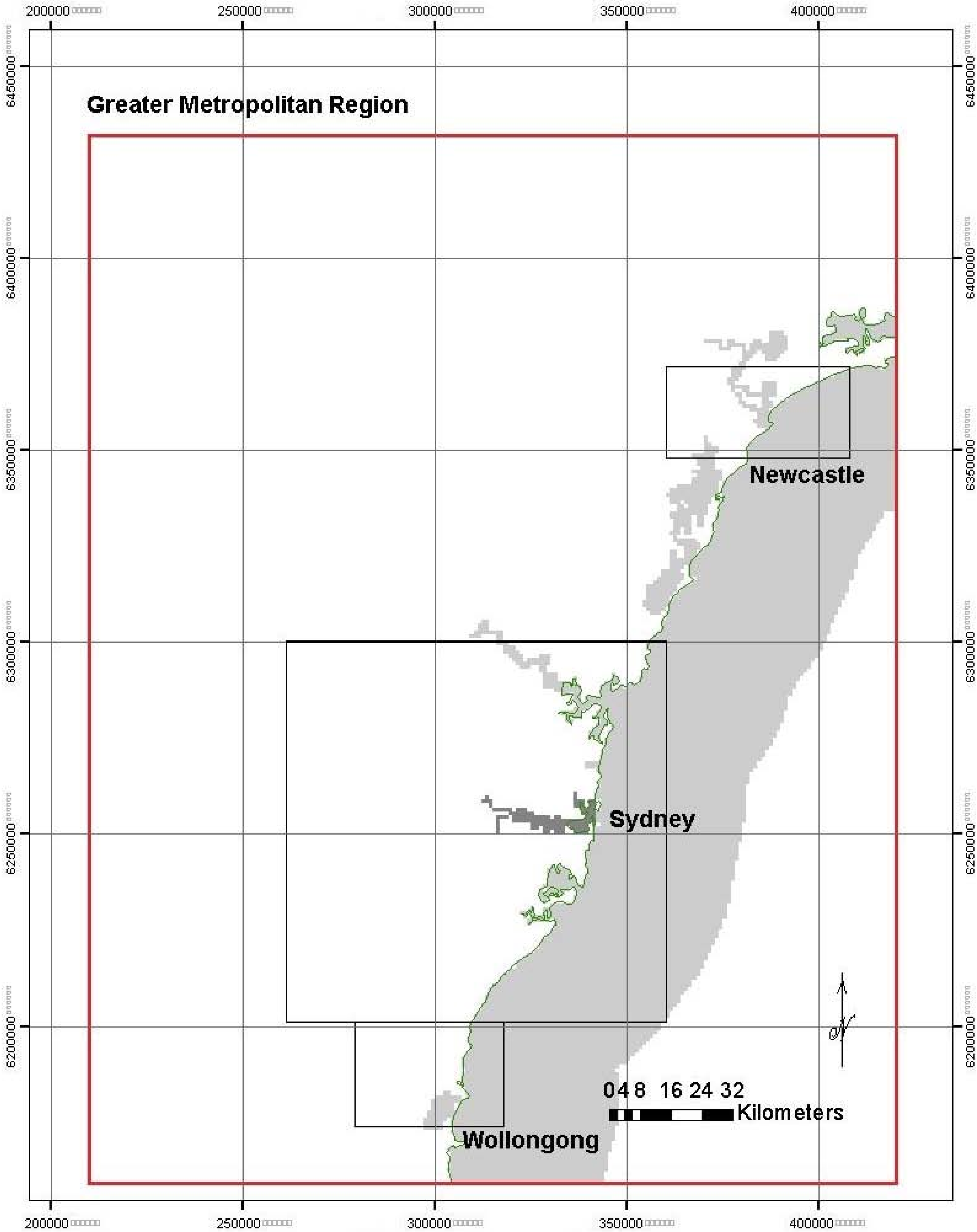

Figure 3.7: Spatial distribution of commercial boats in the GMR

3.2.6 Temporal Variation of Emissions

The following temporal emissions variation profiles have been used for commercial boats:

- Monthly - assumed to be constant for each month of the year (SFC, 2005a);
- Weekly (i.e. Weekday and Weekend day) - assumed to be ~1.07 times higher on weekdays compared with weekend days (SFC, 2005a); and
- Daily – assumed to be constant between 6 am and 11 pm (SFC, 2005a).

Tables 3.23, 3.24 and 3.25 detail the temporal emissions variation profiles that have been used for commercial boats.

Table 3.23: Monthly temporal emissions variation profile for commercial boats

Month	Monthly Temporal Factor		Month	Monthly Temporal Factor	
January	1	8.33%	July	1	8.33%
February	1	8.33%	August	1	8.33%
March	1	8.33%	September	1	8.33%
April	1	8.33%	October	1	8.33%
May	1	8.33%	November	1	8.33%
June	1	8.33%	December	1	8.33%

Table 3.24: Weekly temporal emissions variation profile for commercial boats

Day Type	Weekly Temporal Factor		Day Type	Weekly Temporal Factor	
Weekday	5.00	72.83%	Weekend day	1.87	27.17%

Table 3.25: Daily temporal emissions variation profile for commercial boats

Hour	Weekday Temporal Factor		Weekend day Temporal Factor		Hour	Weekday Temporal Factor		Weekend day Temporal Factor	
1 am	0	0.00%	0	0.00%	1 pm	1	5.88%	1	5.88%
2 am	0	0.00%	0	0.00%	2 pm	1	5.88%	1	5.88%
3 am	0	0.00%	0	0.00%	3 pm	1	5.88%	1	5.88%
4 am	0	0.00%	0	0.00%	4 pm	1	5.88%	1	5.88%
5 am	0	0.00%	0	0.00%	5 pm	1	5.88%	1	5.88%
6 am	1	5.88%	1	5.88%	6 pm	1	5.88%	1	5.88%
7 am	1	5.88%	1	5.88%	7 pm	1	5.88%	1	5.88%
8 am	1	5.88%	1	5.88%	8 pm	1	5.88%	1	5.88%
9 am	1	5.88%	1	5.88%	9 pm	1	5.88%	1	5.88%
10 am	1	5.88%	1	5.88%	10 pm	1	5.88%	1	5.88%
11 am	1	5.88%	1	5.88%	11 pm	0	0.00%	0	0.00%
12 noon	1	5.88%	1	5.88%	12 midnight	0	0.00%	0	0.00%

3.2.7 Emission Estimates

Table 3.26 presents total estimated annual emissions (for selected substances) from commercial boats for the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions. Total estimated annual emissions of all substances from commercial boats are presented in Appendix C.

Table 3.26: Total estimated annual emissions from commercial boats in each region

Substance	Emissions (tonnes/year)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	7.67×10^{-01}	9.37×10^{-02}	6.20×10^{-02}	1.30	2.23
ACETALDEHYDE	$1.01 \times 10^{+01}$	1.23	8.14×10^{-01}	$1.71 \times 10^{+01}$	$2.92 \times 10^{+01}$
BENZENE	8.66	1.06	7.01×10^{-01}	$1.47 \times 10^{+01}$	$2.52 \times 10^{+01}$
CARBON MONOXIDE	$1.92 \times 10^{+03}$	$2.35 \times 10^{+02}$	$1.56 \times 10^{+02}$	$3.27 \times 10^{+03}$	$5.59 \times 10^{+03}$
FORMALDEHYDE	5.92	7.24×10^{-01}	4.79×10^{-01}	$1.01 \times 10^{+01}$	$1.72 \times 10^{+01}$
ISOMERS OF XYLENE	$3.47 \times 10^{+01}$	4.25	2.81	$5.91 \times 10^{+01}$	$1.01 \times 10^{+02}$
LEAD AND COMPOUNDS	1.12×10^{-03}	1.37×10^{-04}	9.07×10^{-05}	1.91×10^{-03}	3.26×10^{-03}
OXIDES OF NITROGEN	$8.53 \times 10^{+02}$	$1.04 \times 10^{+02}$	$6.90 \times 10^{+01}$	$1.45 \times 10^{+03}$	$2.48 \times 10^{+03}$
PARTICULATE MATTER < 10 µm	$5.76 \times 10^{+01}$	7.04	4.66	$9.80 \times 10^{+01}$	$1.67 \times 10^{+02}$
PARTICULATE MATTER < 2.5 µm	$5.34 \times 10^{+01}$	6.53	4.33	$9.10 \times 10^{+01}$	$1.55 \times 10^{+02}$
POLYCYCLIC AROMATIC HYDROCARBONS	1.13	1.38×10^{-01}	9.13×10^{-02}	1.92	3.28
SULFUR DIOXIDE	$2.06 \times 10^{+01}$	2.51	1.66	$3.50 \times 10^{+01}$	$5.98 \times 10^{+01}$
TETRACHLOROETHYLENE	2.54×10^{-01}	3.10×10^{-02}	2.05×10^{-02}	4.32×10^{-01}	7.38×10^{-01}
TOLUENE	$3.19 \times 10^{+01}$	3.90	2.58	$5.43 \times 10^{+01}$	$9.26 \times 10^{+01}$
TOTAL SUSPENDED PARTICULATES	$6.06 \times 10^{+01}$	7.41	4.91	$1.03 \times 10^{+02}$	$1.76 \times 10^{+02}$
TOTAL VOCS	$3.59 \times 10^{+02}$	$4.39 \times 10^{+01}$	$2.91 \times 10^{+01}$	$6.12 \times 10^{+02}$	$1.04 \times 10^{+03}$
TRICHLOROETHYLENE	1.56×10^{-01}	1.91×10^{-02}	1.26×10^{-02}	2.65×10^{-01}	4.53×10^{-01}

Table 3.27 presents total estimated annual emissions (for selected substances) from commercial boats by fuel type for the GMR.

Table 3.27: Total estimated annual emissions from commercial boats by fuel type

Substance	Emissions (tonnes/year)			
	2-Stroke Petrol	4-Stroke Petrol	Diesel	Total
1,3 BUTADIENE	1.96	5.75×10^{-02}	2.05×10^{-01}	2.23
ACETALDEHYDE	1.52	2.48×10^{-02}	$2.77 \times 10^{+01}$	$2.92 \times 10^{+01}$
BENZENE	$2.30 \times 10^{+01}$	3.17×10^{-01}	1.81	$2.52 \times 10^{+01}$
CARBON MONOXIDE	$4.02 \times 10^{+03}$	$8.47 \times 10^{+01}$	$1.49 \times 10^{+03}$	$5.59 \times 10^{+03}$
FORMALDEHYDE	2.32	1.04×10^{-01}	$1.48 \times 10^{+01}$	$1.72 \times 10^{+01}$
ISOMERS OF XYLENE	$9.84 \times 10^{+01}$	4.10×10^{-01}	2.09	$1.01 \times 10^{+02}$
LEAD AND COMPOUNDS	-	-	3.26×10^{-03}	3.26×10^{-03}
OXIDES OF NITROGEN	$6.60 \times 10^{+01}$	$9.78 \times 10^{+01}$	$2.31 \times 10^{+03}$	$2.48 \times 10^{+03}$
PARTICULATE MATTER < 10 µm	$1.16 \times 10^{+02}$	1.42	$4.99 \times 10^{+01}$	$1.67 \times 10^{+02}$
PARTICULATE MATTER < 2.5 µm	$1.07 \times 10^{+02}$	1.31	$4.72 \times 10^{+01}$	$1.55 \times 10^{+02}$
POLYCYCLIC AROMATIC HYDROCARBONS	2.16	1.61×10^{-01}	9.61×10^{-01}	3.28
SULFUR DIOXIDE	2.35	2.31	$5.51 \times 10^{+01}$	$5.98 \times 10^{+01}$
TETRACHLOROETHYLENE	7.33×10^{-01}	5.07×10^{-03}	-	7.38×10^{-01}
TOLUENE	$8.95 \times 10^{+01}$	4.34×10^{-01}	2.64	$9.26 \times 10^{+01}$
TOTAL SUSPENDED PARTICULATES	$1.22 \times 10^{+02}$	1.50	$5.25 \times 10^{+01}$	$1.76 \times 10^{+02}$
TOTAL VOCS	$9.16 \times 10^{+02}$	6.04	$1.23 \times 10^{+02}$	$1.04 \times 10^{+03}$
TRICHLOROETHYLENE	4.50×10^{-01}	3.11×10^{-03}	-	4.53×10^{-01}

Tables 3.28 and 3.29 present total estimated daily emissions (for selected substances) from commercial boats for the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions. These estimates are representative of typical January/July weekday and January/July weekend day daily emissions.

Table 3.28: Total estimated daily emissions from commercial boats in each region for typical January/July weekday

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	2.14×10^{-03}	2.61×10^{-04}	1.73×10^{-04}	3.64×10^{-03}	6.21×10^{-03}
ACETALDEHYDE	2.81×10^{-02}	3.43×10^{-03}	2.27×10^{-03}	4.78×10^{-02}	8.16×10^{-02}
BENZENE	2.42×10^{-02}	2.95×10^{-03}	1.96×10^{-03}	4.11×10^{-02}	7.02×10^{-02}
CARBON MONOXIDE	5.37	6.56×10^{-01}	4.34×10^{-01}	9.14	$1.56 \times 10^{+01}$
FORMALDEHYDE	1.65×10^{-02}	2.02×10^{-03}	1.34×10^{-03}	2.81×10^{-02}	4.80×10^{-02}
ISOMERS OF XYLENE	9.69×10^{-02}	1.18×10^{-02}	7.84×10^{-03}	1.65×10^{-01}	2.82×10^{-01}
LEAD AND COMPOUNDS	3.13×10^{-06}	3.82×10^{-07}	2.53×10^{-07}	5.32×10^{-06}	9.09×10^{-06}
OXIDES OF NITROGEN	2.38	2.91×10^{-01}	1.93×10^{-01}	4.05	6.91
PARTICULATE MATTER < 10 µm	1.61×10^{-01}	1.96×10^{-02}	1.30×10^{-02}	2.73×10^{-01}	4.67×10^{-01}
PARTICULATE MATTER < 2.5 µm	1.49×10^{-01}	1.82×10^{-02}	1.21×10^{-02}	2.54×10^{-01}	4.33×10^{-01}
POLYCYCLIC AROMATIC HYDROCARBONS	3.15×10^{-03}	3.85×10^{-04}	2.55×10^{-04}	5.36×10^{-03}	9.14×10^{-03}
SULFUR DIOXIDE	5.74×10^{-02}	7.01×10^{-03}	4.64×10^{-03}	9.77×10^{-02}	1.67×10^{-01}
TETRACHLOROETHYLENE	7.08×10^{-04}	8.66×10^{-05}	5.73×10^{-05}	1.21×10^{-03}	2.06×10^{-03}
TOLUENE	8.89×10^{-02}	1.09×10^{-02}	7.20×10^{-03}	1.51×10^{-01}	2.58×10^{-01}
TOTAL SUSPENDED PARTICULATES	1.69×10^{-01}	2.07×10^{-02}	1.37×10^{-02}	2.88×10^{-01}	4.91×10^{-01}
TOTAL VOCS	1.00	1.23×10^{-01}	8.12×10^{-02}	1.71	2.91
TRICHLOROETHYLENE	4.35×10^{-04}	5.32×10^{-05}	3.52×10^{-05}	7.41×10^{-04}	1.26×10^{-03}

Table 3.29: Total estimated daily emissions from commercial boats in each region for typical January/July weekend day

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	2.00×10^{-03}	2.45×10^{-04}	1.62×10^{-04}	3.41×10^{-03}	5.82×10^{-03}
ACETALDEHYDE	2.63×10^{-02}	3.21×10^{-03}	2.13×10^{-03}	4.48×10^{-02}	7.64×10^{-02}
BENZENE	2.26×10^{-02}	2.77×10^{-03}	1.83×10^{-03}	3.85×10^{-02}	6.58×10^{-02}
CARBON MONOXIDE	5.03	6.14×10^{-01}	4.07×10^{-01}	8.56	$1.46 \times 10^{+01}$
FORMALDEHYDE	1.55×10^{-02}	1.89×10^{-03}	1.25×10^{-03}	2.63×10^{-02}	4.49×10^{-02}
ISOMERS OF XYLENE	9.08×10^{-02}	1.11×10^{-02}	7.34×10^{-03}	1.54×10^{-01}	2.64×10^{-01}
LEAD AND COMPOUNDS	2.93×10^{-06}	3.58×10^{-07}	2.37×10^{-07}	4.99×10^{-06}	8.51×10^{-06}
OXIDES OF NITROGEN	2.23	2.72×10^{-01}	1.80×10^{-01}	3.79	6.47
PARTICULATE MATTER < 10 µm	1.50×10^{-01}	1.84×10^{-02}	1.22×10^{-02}	2.56×10^{-01}	4.37×10^{-01}
PARTICULATE MATTER < 2.5 µm	1.40×10^{-01}	1.71×10^{-02}	1.13×10^{-02}	2.38×10^{-01}	4.06×10^{-01}
POLYCYCLIC AROMATIC HYDROCARBONS	2.95×10^{-03}	3.60×10^{-04}	2.38×10^{-04}	5.02×10^{-03}	8.56×10^{-03}
SULFUR DIOXIDE	5.37×10^{-02}	6.57×10^{-03}	4.35×10^{-03}	9.15×10^{-02}	1.56×10^{-01}
TETRACHLOROETHYLENE	6.63×10^{-04}	8.11×10^{-05}	5.37×10^{-05}	1.13×10^{-03}	1.93×10^{-03}
TOLUENE	8.33×10^{-02}	1.02×10^{-02}	6.74×10^{-03}	1.42×10^{-01}	2.42×10^{-01}
TOTAL SUSPENDED PARTICULATES	1.58×10^{-01}	1.94×10^{-02}	1.28×10^{-02}	2.70×10^{-01}	4.60×10^{-01}
TOTAL VOCS	9.39×10^{-01}	1.15×10^{-01}	7.60×10^{-02}	1.60	2.73
TRICHLOROETHYLENE	4.07×10^{-04}	4.98×10^{-05}	3.30×10^{-05}	6.94×10^{-04}	1.18×10^{-03}

3.2.8 Emission Projection Methodology

Emission projection factors for commercial boats use domestic water transport oil consumption growth as the surrogate. Emission projection factors for commercial boats have been developed using the following data:

- Domestic water transport oil consumption growth data (ABARE, 2005b).

Emission projection factors have been developed for every year from 2004 to 2031 (emissions for the base year 2003 are based on the activity data obtained coupled with the emission estimation techniques). Table 3.30 presents the emission projection factors for commercial boats.

Table 3.30: Emission projection factors for commercial boats

Year	Emission Projection Factors [1]	Year	Emission Projection Factors [1]
2004	1.0030	2018	1.0462
2005	1.0060	2019	1.0494
2006	1.0091	2020	1.0525
2007	1.0121	2021	1.0557
2008	1.0152	2022	1.0589
2009	1.0182	2023	1.0621
2010	1.0213	2024	1.0653
2011	1.0244	2025	1.0685
2012	1.0275	2026	1.0717
2013	1.0306	2027	1.0750
2014	1.0337	2028	1.0782
2015	1.0368	2029	1.0814
2016	1.0399	2030	1.0847
2017	1.0431	2031	1.0880

[1] Data Source: (ABARE, 2005b), http://www.abareconomics.com/data_services/excel/TPEC 05.xls?prodid=13183.

3.3 Commercial Off-Road Vehicles and Equipment

3.3.1 Emission Source Description

Emissions of combustion products and wheel generated dust emissions from commercial off-road vehicles and equipment arise from the use of unregistered 4-stroke petrol, diesel, electric and liquefied petroleum gas (LPG) engines on paved and unpaved roads at various commercial businesses. Commercial businesses include activities that are not scheduled under the Protection of the Environment (Operations) Act 1997 and therefore not required to hold an Environment Protection License. The off-road mobile air emissions inventory includes the following types of commercial off-road vehicles and equipment:

- Aerial lifts;
- Bulldozers;
- Cranes;
- Excavators;
- Forklifts;
- Loaders;
- Off-highway trucks
- Other equipment;
- Rubber tyre loaders;
- Skid steer loaders;
- Tractors; and
- Tractors, loaders and backhoes.

Emissions from construction and industrial off-road vehicles and equipment have been separately estimated for the entire GMR and the results are presented in Sections 3.5 and 3.6 respectively.

3.3.2 Emission Estimation Methodology

- **Exhaust emissions**

Exhaust emissions from commercial off-road vehicles and equipment have been estimated using the NONROAD2005 Model (USEPA, 2005e), which requires vehicle and equipment type, fuel type, operating hours and area of operation data to be obtained from a commercial survey. Operating hours data for each vehicle/equipment and fuel type have been combined with time based emission factors to estimate emissions for each substance. The NONROAD2005 Model estimates exhaust emissions for each specific type of commercial off-road vehicle and equipment using the following input data estimates:

- Vehicle population for base year, distributed by age, power, fuel type, and application;
- Average load factor expressed as average fraction of available power;
- Available power in horsepower;
- Activity in hours of use per year; and
- Emission factor with deterioration and/or new standards.

Exhaust emissions from commercial off-road vehicles and equipment have been calculated using the following formula:

$$E_{i,j,k} = EF_{i,j,k} \times SF_{i,j,k} \times OT_{j,k} \times N_{j,k} \text{ x } LF_{j,k}$$

where:

$E_{i,j,k}$	=	Emission of substance i from fuel type j and commercial off-road vehicle/equipment type k	(kg/year)
$EF_{i,j,k}$	=	Time based emission factor of substance i for fuel type j and commercial off-road vehicle/equipment type k	(kg/hr)
$SF_{i,j,k}$	=	NO_x, VOC or PM speciation factor of substance i for fuel type j and commercial off-road vehicle/equipment type k	(%)
$OT_{j,k}$	=	Operating time for fuel type j and commercial off-road vehicle/equipment type k	(hr/year)
$N_{j,k}$	=	Number with fuel type j and commercial off-road vehicle/equipment type k	(Number)
$LF_{j,k}$	=	Load factor for fuel type j and commercial off-road vehicle/equipment type k	(%)

- ❑ **Wheel generated dust emissions**

Wheel generated dust emissions from commercial off-road vehicles have been estimated using the preferred method (Environment Australia, 1999b), which requires vehicle weight, vehicle kilometres travelled (VKT), proportion of VKT on paved and unpaved roads and area of operation data to be obtained from a commercial survey. Vehicle kilometres travelled and vehicle weight data for each road type have been combined with mass based emission factors to estimate emissions for each substance.

Wheel generated dust emissions from commercial off-road vehicles on *paved roads* have been calculated using the following formula:

$$E_i = k_i \times (sL/2)^{0.65} \times (AW/3)^{1.5} \times SF_i \times VKT$$

where:

E_i	=	Emission of particle size i	(kg/year)
k_i	=	Empirical factor for particle size i	(Factor)
sL	=	Road surface silt loading	(g/m^2)
AW	=	Average vehicle weight	(Tonnes)
SF_i	=	PM speciation factor of particle size i	(%)
VKT	=	Vehicle kilometres travelled	(Kilometres)

Wheel generated dust emissions from commercial off-road vehicles on *unpaved roads* have been calculated using the following formula:

$$E_i = (k_i \times (sL/12)^{A_i} \times (AW/3)^{B_i} / (M/0.2)^{C_i}) \times SF_i \times VKT$$

where:

E_i	=	Emission of particle size i	(kg/year)
k_i	=	Empirical factor for particle size i	(Factor)
sL	=	Road surface silt loading	(g/m^2)
AW	=	Average vehicle weight	(Tonnes)
M	=	Road surface moisture content	(%)
SF_i	=	PM speciation factor of particle size i	(%)
VKT	=	Vehicle kilometres travelled	(Kilometres)
A_i	=	Empirical factor for particle size i	(Factor)
B_i	=	Empirical factor for particle size i	(Factor)
C_i	=	Empirical factor for particle size i	(Factor)

3.3.3 Activity Data

A commercial survey was conducted during 2004 and 2005 to obtain activity data for commercial off-road vehicles and equipment (DECC, 2007a). The purpose of the commercial survey was to obtain sufficient data so that emissions of combustion products and wheel generated dust emissions could be estimated from the use of unregistered 4-stroke petrol, diesel and liquefied petroleum gas (LPG) engines on paved and unpaved roads for various commercial activities.

The following activity data was collected through the commercial survey:

- Off-road vehicle/equipment operating location;
- Number and type of vehicle/equipment;
- Vehicle/equipment year and model;
- Engine size or power rating and fuel type;
- Fuel usage;
- Operating time, frequency and duration;
- Vehicle kilometres travelled (VKT); and
- Proportion of VKT on paved and unpaved roads.

A sample commercial survey questionnaire form used to collect activity data is presented in Appendix A.

Activity data required for estimating emissions from commercial off-road vehicles and equipment includes:

- Area of operation (DECC, 2007a);
- Population, engine power and fuel type (DECC, 2007a);
- Average load factor expressed as average fraction of available power (USEPA, 2004c);
- Activity in hours of use per year (DECC, 2007a);
- VKT and proportion of VKT on paved and unpaved roads (DECC, 2007a);
- Average vehicle weight (DECC, 2007a);
- Road surface silt loading (Environment Australia, 1999b); and
- Road surface moisture content (Environment Australia, 1999b).

Based on the commercial survey, activity data was obtained for 96 commercial businesses and this information was proportionally applied to an additional 628 commercial businesses using the size of operation as the surrogate. In total, emissions from 724 commercial businesses have been estimated.

Table 3.31 includes the type and number of commercial off-road vehicles and equipment in the GMR based on the 96 commercial businesses where activity data was obtained through the commercial survey.

Table 3.31: Commercial off-road vehicles and equipment – vehicle/equipment type and number during 2003 in the GMR

Vehicle/Equipment Type [1]	Number of Vehicles/Equipment [1]
Aerial lifts	2
Bulldozers	2
Cranes	3
Excavators	2
Forklifts	168
Loaders	17
Off-highway trucks	23
Other equipment	28
Rubber tyre loaders	6
Skid steer loaders	1
Tractors	18
Tractors, loaders and backhoes	2
Total Commercial Off-Road Vehicles and Equipment	272

[1] Data Source: (DECC, 2007a).

Tables 3.32 and 3.33 include the number of commercial off-road vehicles and equipment with a given fuel type and engine power range respectively in the GMR based on the 96 commercial businesses where activity data was obtained through the commercial survey.

Table 3.32: Commercial off-road vehicles and equipment – fuel type during 2003 in the GMR

Fuel Type [1]	Number Of Vehicles/Equipment [1]
4-stroke petrol	22
Diesel	132
Electric	3
LPG	115
Total Commercial Off-Road Vehicles and Equipment	272

[1] Data Source: (DECC, 2007a).

Table 3.33: Commercial off-road vehicles and equipment – engine power range during 2003 in the GMR

Engine Power Range (kW) [1]	Number of 4-Stroke Petrol Vehicles/Equipment [1]	Number of Diesel Vehicles/Equipment [1]	Number of Electric Vehicles/Equipment [1]	Number of LPG Vehicles/Equipment [1]
< 50	12	66	3	100
50 to 99	-	20	-	11
100 to 149	10	11	-	4
150 to 199	-	8	-	-
200 to 299	-	19	-	-
300 to 500	-	7	-	-
> 500	-	1	-	-
Total Fuel Type	22	132	3	115
Total Vehicles and Equipment	272			

[1] Data Source: (DECC, 2007a).

Figure 3.8 shows the proportion of commercial off-road vehicles and equipment with a given fuel type and engine power range in the GMR.

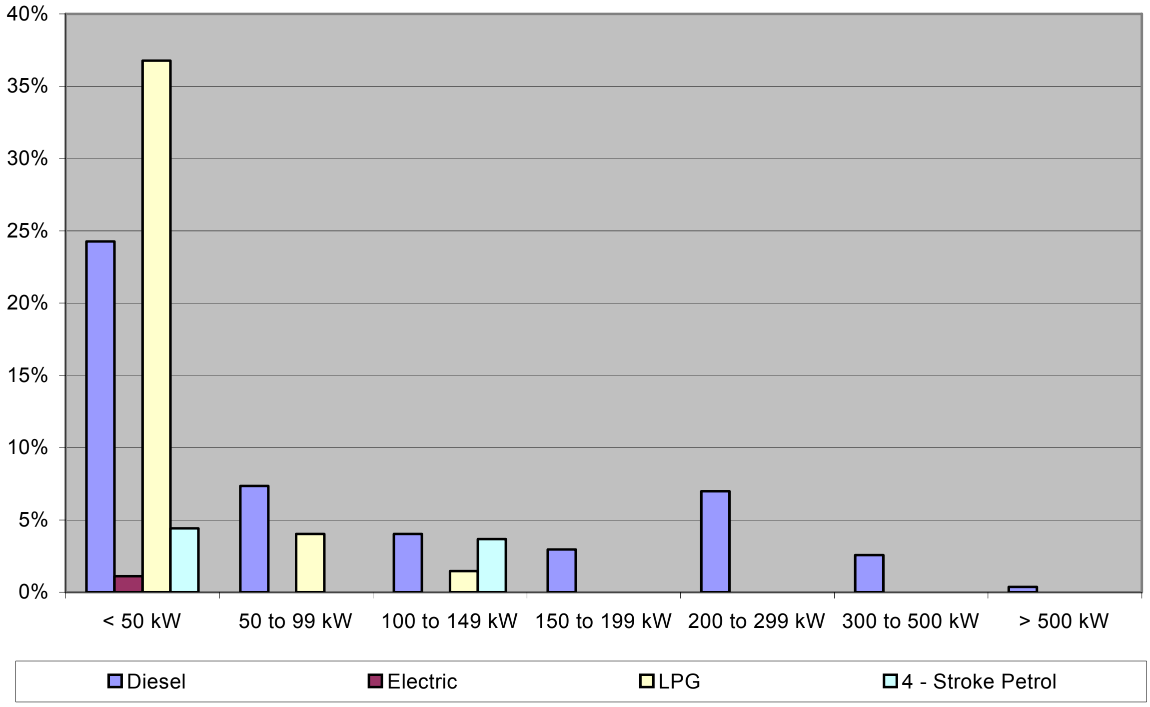

Figure 3.8: Proportion of fuel type and engine power range for commercial off-road vehicles and equipment during 2003 in the GMR

3.3.4 Emission and Speciation Factors

The emission and speciation factors for all substances from commercial off-road vehicles and equipment exhaust are detailed in Table 3.34.

Table 3.34: Emission and speciation factors for all substances from commercial off-road vehicles and equipment exhaust

Substance	Fuel Type		Emission Factor Source
CO, NO_x[1], PM_{10}, SO_2 & Total VOC	All		(USEPA, 2005e)
$PM_{2.5}$ & TSP	4-stroke petrol		(USEPA, 2004a & USEPA, 2004b) & (Norbeck et. al., 1998)
	Diesel		(USEPA, 2005e) & (Klimont et. al., 2002)
	LPG		(USEPA, 2004a & USEPA, 2004b) & (Norbeck et. al., 1998)
Organic air toxics	4-stroke petrol		Appendix D (ERG, 2003)
	Diesel		(Pechan, 2006) replacing Profile Number 1201 (USEPA, 2002)
	LPG		(Environment Australia, 2000)
Metal air toxics	All		(Environment Australia, 2000)
PAH	4-stroke petrol & Diesel	PM phase	Appendix D (ERG, 2003)
		VOC phase	(Khalili et. al., 1995)
	LPG		NA
PCDD/PCDF	4-stroke petrol & Diesel		Appendix D (ERG, 2003)
	LPG		NA
Speciated VOC & Methane	4-stroke petrol [2]		Profile Number 1203 (USEPA, 2002)
	Diesel		(Pechan, 2006) replacing Profile Number 1201 (USEPA, 2002)
	LPG		Profile Number 1001 (USEPA, 2002)

[1] The default NO_x speciation profile used in the inventory is 5 % NO_2 and 95% NO (USEPA, 2005a).
[2] Profile Number 0000 (USEPA, 2002) for "Unidentified" VOC.

The emission and speciation factors for all substances from commercial off-road vehicles wheel generated dust are detailed in Table 3.35.

Table 3.35: Emission and speciation factors for all substances from commercial off-road vehicles wheel generated dust

Substance	Emission Factor Source
PM_{10} & TSP	(Environment Australia, 1999b)
$PM_{2.5}$	(USEPA, 2003a) & (USEPA, 2003b)
Metal air toxics	(Environment Australia, 1999b)

3.3.5 Spatial Distribution of Emissions

Emissions from commercial off-road vehicles and equipment have been spatially distributed according to activity data obtained in the commercial survey (DECC, 2007a). Total emissions of each substance have been spatially distributed to each 1 km by 1 km grid cell according to the location of each commercial business. Figure 3.9 shows the spatial distribution of commercial off-road vehicles and equipment in the GMR.

3.3.6 Temporal Variation of Emissions

Monthly, weekly and daily temporal emissions variation profiles for each commercial business have been based on activity data obtained in the commercial survey (DECC, 2007a).

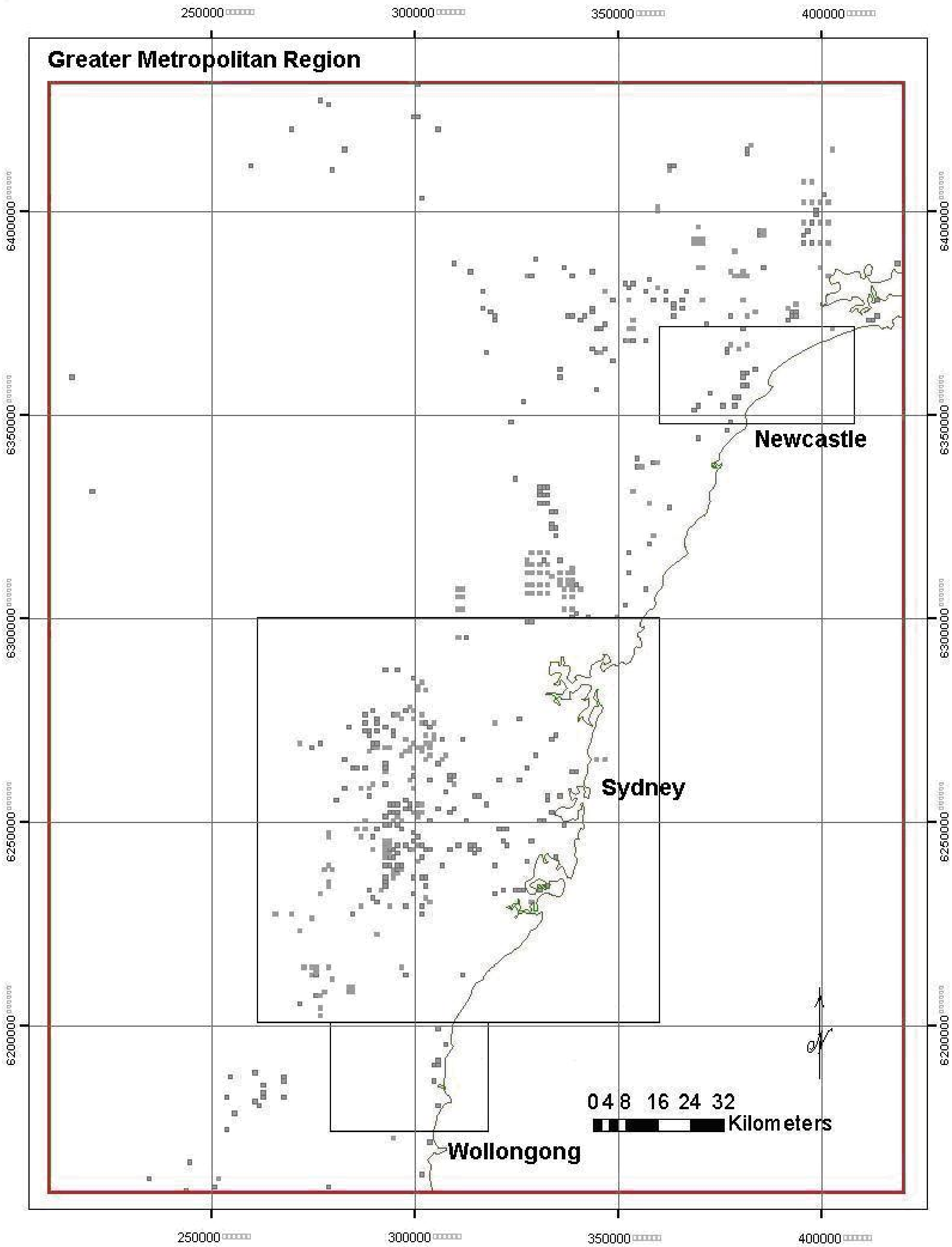

Figure 3.9: Spatial distribution of commercial off-road vehicles and equipment in the GMR

3.3.7 Emission Estimates

Table 3.36 presents total estimated annual emissions (for selected substances) from commercial off-road vehicles and equipment for the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions. Total estimated annual emissions of all substances from commercial off-road vehicles and equipment are presented in Appendix C.

Table 3.36: Total estimated annual emissions from commercial off-road vehicles and equipment in each region

Substance	Emissions (tonnes/year)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	1.25×10^{-01}	1.49×10^{-02}	5.15×10^{-03}	1.41×10^{-01}	2.86×10^{-01}
ACETALDEHYDE	7.67	9.15×10^{-01}	3.17×10^{-01}	8.69	$1.76 \times 10^{+01}$
BENZENE	8.68×10^{-01}	1.04×10^{-01}	3.58×10^{-02}	9.84×10^{-01}	1.99
CARBON MONOXIDE	$5.26 \times 10^{+02}$	$6.27 \times 10^{+01}$	$2.17 \times 10^{+01}$	$5.96 \times 10^{+02}$	$1.21 \times 10^{+03}$
FORMALDEHYDE	4.23	5.05×10^{-01}	1.75×10^{-01}	4.80	9.71
ISOMERS OF XYLENE	1.10	1.31×10^{-01}	4.53×10^{-02}	1.24	2.52
LEAD AND COMPOUNDS	1.84	2.19×10^{-01}	7.59×10^{-02}	2.08	4.22
OXIDES OF NITROGEN	$4.40 \times 10^{+02}$	$5.24 \times 10^{+01}$	$1.81 \times 10^{+01}$	$4.98 \times 10^{+02}$	$1.01 \times 10^{+03}$
PARTICULATE MATTER < 10 µm	$5.05 \times 10^{+02}$	$6.02 \times 10^{+01}$	$2.09 \times 10^{+01}$	$5.72 \times 10^{+02}$	$1.16 \times 10^{+03}$
PARTICULATE MATTER < 2.5 µm	$2.30 \times 10^{+02}$	$2.75 \times 10^{+01}$	9.51	$2.61 \times 10^{+02}$	$5.28 \times 10^{+02}$
POLYCYCLIC AROMATIC HYDROCARBONS	3.12×10^{-01}	3.73×10^{-02}	1.29×10^{-02}	3.54×10^{-01}	7.17×10^{-01}
SULFUR DIOXIDE	$1.38 \times 10^{+01}$	1.64	5.69×10^{-01}	$1.56 \times 10^{+01}$	$3.16 \times 10^{+01}$
TETRACHLOROETHYLENE	5.23×10^{-03}	6.24×10^{-04}	2.16×10^{-04}	5.93×10^{-03}	1.20×10^{-02}
TOLUENE	1.28	1.52×10^{-01}	5.26×10^{-02}	1.44	2.92
TOTAL SUSPENDED PARTICULATES	$2.14 \times 10^{+03}$	$2.56 \times 10^{+02}$	$8.86 \times 10^{+01}$	$2.43 \times 10^{+03}$	$4.92 \times 10^{+03}$
TOTAL VOCS	$6.59 \times 10^{+01}$	7.86	2.72	$7.46 \times 10^{+01}$	$1.51 \times 10^{+02}$
TRICHLOROETHYLENE	3.21×10^{-03}	3.83×10^{-04}	1.33×10^{-04}	3.64×10^{-03}	7.37×10^{-03}

Table 3.37 presents total estimated annual emissions (for selected substances) from commercial off-road vehicles and equipment by fuel type for exhaust emissions and wheel generated dust emissions for the GMR.

Table 3.37: Total estimated annual emissions from commercial off-road vehicles and equipment by fuel type for exhaust emissions and wheel generated dust emissions

Substance	Emissions (tonnes/year)				
	4-Stroke Petrol	Diesel	LPG	Wheel Generated Dust	Total
1,3 BUTADIENE	1.53×10^{-01}	1.30×10^{-01}	3.18×10^{-03}	-	2.86×10^{-01}
ACETALDEHYDE	6.60×10^{-02}	$1.75 \times 10^{+01}$	3.54×10^{-02}	-	$1.76 \times 10^{+01}$
BENZENE	8.45×10^{-01}	1.15	5.43×10^{-04}	-	1.99
CARBON MONOXIDE	$2.33 \times 10^{+02}$	$2.85 \times 10^{+02}$	$6.89 \times 10^{+02}$	-	$1.21 \times 10^{+03}$
FORMALDEHYDE	2.76×10^{-01}	9.33	1.02×10^{-01}	-	9.71
ISOMERS OF XYLENE	1.09	1.32	1.03×10^{-01}	-	2.52
LEAD AND COMPOUNDS	1.48×10^{-03}	8.29×10^{-03}	8.78×10^{-04}	4.21	4.22
OXIDES OF NITROGEN	$1.60 \times 10^{+01}$	$8.21 \times 10^{+02}$	$1.71 \times 10^{+02}$	-	$1.01 \times 10^{+03}$
PARTICULATE MATTER < 10 µm	2.10×10^{-01}	$8.29 \times 10^{+01}$	1.76	$1.07 \times 10^{+03}$	$1.16 \times 10^{+03}$
PARTICULATE MATTER < 2.5 µm	1.93×10^{-01}	$8.04 \times 10^{+01}$	1.76	$4.46 \times 10^{+02}$	$5.28 \times 10^{+02}$
POLYCYCLIC AROMATIC HYDROCARBONS	5.66×10^{-02}	6.60×10^{-01}	-	-	7.17×10^{-01}
SULFUR DIOXIDE	1.61×10^{-01}	$3.06 \times 10^{+01}$	8.91×10^{-01}	-	$3.16 \times 10^{+01}$
TETRACHLOROETHYLENE	1.20×10^{-02}	-	-	-	1.20×10^{-02}
TOLUENE	1.16	1.66	1.03×10^{-01}	-	2.92
TOTAL SUSPENDED PARTICULATES	2.21×10^{-01}	$8.73 \times 10^{+01}$	1.85	$4.83 \times 10^{+03}$	$4.92 \times 10^{+03}$
TOTAL VOCS	$1.61 \times 10^{+01}$	$7.74 \times 10^{+01}$	$5.76 \times 10^{+01}$	-	$1.51 \times 10^{+02}$
TRICHLOROETHYLENE	7.37×10^{-03}	-	-	-	7.37×10^{-03}

Tables 3.38, 3.39, 3.40 and 3.41 present total estimated daily emissions (for selected substances) from commercial off-road vehicles and equipment for the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions. These estimates are representative of typical January weekday, January weekend day, July weekday and July weekend day daily emissions.

Table 3.38: Total estimated daily emissions from commercial off-road vehicles and equipment in each region for typical January weekday

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	3.13×10^{-04}	3.74×10^{-05}	1.29×10^{-05}	3.55×10^{-04}	7.19×10^{-04}
ACETALDEHYDE	1.93×10^{-02}	2.30×10^{-03}	7.95×10^{-04}	2.18×10^{-02}	4.42×10^{-02}
BENZENE	2.18×10^{-03}	2.60×10^{-04}	9.00×10^{-05}	2.47×10^{-03}	5.00×10^{-03}
CARBON MONOXIDE	1.32	1.58×10^{-01}	5.45×10^{-02}	1.50	3.03
FORMALDEHYDE	1.06×10^{-02}	1.27×10^{-03}	4.39×10^{-04}	1.20×10^{-02}	2.44×10^{-02}
ISOMERS OF XYLENE	2.76×10^{-03}	3.29×10^{-04}	1.14×10^{-04}	3.12×10^{-03}	6.32×10^{-03}
LEAD AND COMPOUNDS	4.62×10^{-03}	5.51×10^{-04}	1.91×10^{-04}	5.23×10^{-03}	1.06×10^{-02}
OXIDES OF NITROGEN	1.10	1.32×10^{-01}	4.56×10^{-02}	1.25	2.53
PARTICULATE MATTER < 10 µm	1.27	1.51×10^{-01}	5.24×10^{-02}	1.44	2.91
PARTICULATE MATTER < 2.5 µm	5.79×10^{-01}	6.90×10^{-02}	2.39×10^{-02}	6.55×10^{-01}	1.33
POLYCYCLIC AROMATIC HYDROCARBONS	7.85×10^{-04}	9.36×10^{-05}	3.24×10^{-05}	8.89×10^{-04}	1.80×10^{-03}
SULFUR DIOXIDE	3.46×10^{-02}	4.13×10^{-03}	1.43×10^{-03}	3.92×10^{-02}	7.94×10^{-02}
TETRACHLOROETHYLENE	1.31×10^{-05}	1.57×10^{-06}	5.42×10^{-07}	1.49×10^{-05}	3.01×10^{-05}
TOLUENE	3.20×10^{-03}	3.82×10^{-04}	1.32×10^{-04}	3.63×10^{-03}	7.34×10^{-03}
TOTAL SUSPENDED PARTICULATES	5.39	6.42×10^{-01}	2.22×10^{-01}	6.10	$1.24 \times 10^{+01}$
TOTAL VOCS	1.65×10^{-01}	1.97×10^{-02}	6.83×10^{-03}	1.87×10^{-01}	3.79×10^{-01}
TRICHLOROETHYLENE	8.07×10^{-06}	9.63×10^{-07}	3.33×10^{-07}	9.14×10^{-06}	1.85×10^{-05}

Table 3.39: Total estimated daily emissions from commercial off-road vehicles and equipment in each region for typical January weekend day

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	3.54×10^{-04}	4.22×10^{-05}	1.46×10^{-05}	4.01×10^{-04}	8.11×10^{-04}
ACETALDEHYDE	2.17×10^{-02}	2.59×10^{-03}	8.97×10^{-04}	2.46×10^{-02}	4.98×10^{-02}
BENZENE	2.46×10^{-03}	2.93×10^{-04}	1.02×10^{-04}	2.79×10^{-03}	5.64×10^{-03}
CARBON MONOXIDE	1.49	1.78×10^{-01}	6.15×10^{-02}	1.69	3.42
FORMALDEHYDE	1.20×10^{-02}	1.43×10^{-03}	4.95×10^{-04}	1.36×10^{-02}	2.75×10^{-02}
ISOMERS OF XYLENE	3.11×10^{-03}	3.71×10^{-04}	1.28×10^{-04}	3.52×10^{-03}	7.13×10^{-03}
LEAD AND COMPOUNDS	5.21×10^{-03}	6.21×10^{-04}	2.15×10^{-04}	5.90×10^{-03}	1.19×10^{-02}
OXIDES OF NITROGEN	1.25	1.49×10^{-01}	5.14×10^{-02}	1.41	2.86
PARTICULATE MATTER < 10 µm	1.43	1.71×10^{-01}	5.91×10^{-02}	1.62	3.28
PARTICULATE MATTER < 2.5 µm	6.53×10^{-01}	7.79×10^{-02}	2.70×10^{-02}	7.40×10^{-01}	1.50
POLYCYCLIC AROMATIC HYDROCARBONS	8.85×10^{-04}	1.06×10^{-04}	3.66×10^{-05}	1.00×10^{-03}	2.03×10^{-03}
SULFUR DIOXIDE	3.91×10^{-02}	4.66×10^{-03}	1.61×10^{-03}	4.43×10^{-02}	8.96×10^{-02}
TETRACHLOROETHYLENE	1.48×10^{-05}	1.77×10^{-06}	6.12×10^{-07}	1.68×10^{-05}	3.40×10^{-05}
TOLUENE	3.61×10^{-03}	4.31×10^{-04}	1.49×10^{-04}	4.09×10^{-03}	8.29×10^{-03}
TOTAL SUSPENDED PARTICULATES	6.08	7.25×10^{-01}	2.51×10^{-01}	6.89	$1.39 \times 10^{+01}$
TOTAL VOCS	1.87×10^{-01}	2.23×10^{-02}	7.71×10^{-03}	2.12×10^{-01}	4.28×10^{-01}
TRICHLOROETHYLENE	9.11×10^{-06}	1.09×10^{-06}	3.76×10^{-07}	1.03×10^{-05}	2.09×10^{-05}

Table 3.40: Total estimated daily emissions from commercial off-road vehicles and equipment in each region for typical July weekday

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	3.25×10^{-04}	3.88×10^{-05}	1.34×10^{-05}	3.68×10^{-04}	7.45×10^{-04}
ACETALDEHYDE	2.00×10^{-02}	2.38×10^{-03}	8.24×10^{-04}	2.26×10^{-02}	4.58×10^{-02}
BENZENE	2.26×10^{-03}	2.70×10^{-04}	9.34×10^{-05}	2.56×10^{-03}	5.19×10^{-03}
CARBON MONOXIDE	1.37	1.63×10^{-01}	5.65×10^{-02}	1.55	3.14
FORMALDEHYDE	1.10×10^{-02}	1.31×10^{-03}	4.55×10^{-04}	1.25×10^{-02}	2.53×10^{-02}
ISOMERS OF XYLENE	2.86×10^{-03}	3.41×10^{-04}	1.18×10^{-04}	3.24×10^{-03}	6.55×10^{-03}
LEAD AND COMPOUNDS	4.79×10^{-03}	5.71×10^{-04}	1.98×10^{-04}	5.42×10^{-03}	1.10×10^{-02}
OXIDES OF NITROGEN	1.14	1.37×10^{-01}	4.73×10^{-02}	1.30	2.63
PARTICULATE MATTER < 10 µm	1.32	1.57×10^{-01}	5.43×10^{-02}	1.49	3.02
PARTICULATE MATTER < 2.5 µm	6.00×10^{-01}	7.16×10^{-02}	2.48×10^{-02}	6.80×10^{-01}	1.38
POLYCYCLIC AROMATIC HYDROCARBONS	8.14×10^{-04}	9.71×10^{-05}	3.36×10^{-05}	9.22×10^{-04}	1.87×10^{-03}
SULFUR DIOXIDE	3.59×10^{-02}	4.28×10^{-03}	1.48×10^{-03}	4.07×10^{-02}	8.23×10^{-02}
TETRACHLOROETHYLENE	1.36×10^{-05}	1.63×10^{-06}	5.63×10^{-07}	1.54×10^{-05}	3.13×10^{-05}
TOLUENE	3.32×10^{-03}	3.96×10^{-04}	1.37×10^{-04}	3.76×10^{-03}	7.62×10^{-03}
TOTAL SUSPENDED PARTICULATES	5.59	6.66×10^{-01}	2.31×10^{-01}	6.33	$1.28 \times 10^{+01}$
TOTAL VOCS	1.72×10^{-01}	2.05×10^{-02}	7.08×10^{-03}	1.94×10^{-01}	3.93×10^{-01}
TRICHLOROETHYLENE	8.37×10^{-06}	9.98×10^{-07}	3.46×10^{-07}	9.48×10^{-06}	1.92×10^{-05}

Table 3.41: Total estimated daily emissions from commercial off-road vehicles and equipment in each region for typical July weekend day

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	3.67×10^{-04}	4.37×10^{-05}	1.51×10^{-05}	4.15×10^{-04}	8.41×10^{-04}
ACETALDEHYDE	2.25×10^{-02}	2.69×10^{-03}	9.30×10^{-04}	2.55×10^{-02}	5.17×10^{-02}
BENZENE	2.55×10^{-03}	3.04×10^{-04}	1.05×10^{-04}	2.89×10^{-03}	5.85×10^{-03}
CARBON MONOXIDE	1.55	1.84×10^{-01}	6.38×10^{-02}	1.75	3.55
FORMALDEHYDE	1.24×10^{-02}	1.48×10^{-03}	5.13×10^{-04}	1.41×10^{-02}	2.85×10^{-02}
ISOMERS OF XYLENE	3.22×10^{-03}	3.85×10^{-04}	1.33×10^{-04}	3.65×10^{-03}	7.40×10^{-03}
LEAD AND COMPOUNDS	5.40×10^{-03}	6.44×10^{-04}	2.23×10^{-04}	6.12×10^{-03}	1.24×10^{-02}
OXIDES OF NITROGEN	1.29	1.54×10^{-01}	5.33×10^{-02}	1.46	2.96
PARTICULATE MATTER < 10 µm	1.48	1.77×10^{-01}	6.13×10^{-02}	1.68	3.40
PARTICULATE MATTER < 2.5 µm	6.77×10^{-01}	8.08×10^{-02}	2.80×10^{-02}	7.67×10^{-01}	1.55
POLYCYCLIC AROMATIC HYDROCARBONS	9.18×10^{-04}	1.10×10^{-04}	3.79×10^{-05}	1.04×10^{-03}	2.11×10^{-03}
SULFUR DIOXIDE	4.05×10^{-02}	4.83×10^{-03}	1.67×10^{-03}	4.59×10^{-02}	9.29×10^{-02}
TETRACHLOROETHYLENE	1.54×10^{-05}	1.83×10^{-06}	6.35×10^{-07}	1.74×10^{-05}	3.53×10^{-05}
TOLUENE	3.75×10^{-03}	4.47×10^{-04}	1.55×10^{-04}	4.25×10^{-03}	8.59×10^{-03}
TOTAL SUSPENDED PARTICULATES	6.30	7.52×10^{-01}	2.60×10^{-01}	7.14	$1.45 \times 10^{+01}$
TOTAL VOCS	1.94×10^{-01}	2.31×10^{-02}	7.99×10^{-03}	2.19×10^{-01}	4.44×10^{-01}
TRICHLOROETHYLENE	9.45×10^{-06}	1.13×10^{-06}	3.90×10^{-07}	1.07×10^{-05}	2.17×10^{-05}

3.3.8 Emission Projection Methodology

Emission projection factors for commercial off-road vehicles and equipment use total primary energy consumption (minus transport and residential) growth as the surrogate. Emission projection factors for commercial off-road vehicles and equipment have been developed using the following data:

- Total primary energy consumption (minus transport and residential) growth data (ABARE, 2005b).

Emission projection factors have been developed for every year from 2004 to 2031 (emissions for the base year 2003 are based on the activity data obtained coupled with the emission estimation techniques). Table 3.42 presents the emission projection factors for commercial off-road vehicles and equipment.

Table 3.42: Emission projection factors for commercial off-road vehicles and equipment

Year	Emission Projection Factors [1]	Year	Emission Projection Factors [1]
2004	1.0149	2018	1.2490
2005	1.0301	2019	1.2676
2006	1.0455	2020	1.2865
2007	1.0611	2021	1.3057
2008	1.0769	2022	1.3252
2009	1.0930	2023	1.3450
2010	1.1093	2024	1.3651
2011	1.1259	2025	1.3855
2012	1.1427	2026	1.4062
2013	1.1598	2027	1.4272
2014	1.1771	2028	1.4485
2015	1.1946	2029	1.4701
2016	1.2125	2030	1.4921
2017	1.2306	2031	1.5143

[1] Data Source: (ABARE, 2005b), http://www.abareconomics.com/data_services/excel/TPEC 05.xls?prodid=13183.

3.4 Commercial Ships

3.4.1 Emission Source Description

Emission sources of combustion products from commercial ships and auxiliary power units included in the off-road mobile air emissions inventory are as follows:

- ❑ **Port locations include:**
  - Port Botany; Port Jackson; Port Newcastle; and Port Kembla.
- ❑ **Commercial ships during the following mode of operation:**
  - While in transit along shipping routes within the GMR. The shipping routes include the distance travelled from ocean to port and port to berth for both ship arrivals and departures within the GMR.
- ❑ **Auxiliary power units (APU) include:**
  - While at anchorage off the coast, berth at port and transit along shipping routes within the GMR. Auxiliary power units for all commercial ships are assumed to have a power of 600 kW and use diesel fuel (Environment Australia, 1999a).
- ❑ All commercial ship types included in shipping logs provided by port authorities, including the following examples:
  - Cargo and container vessels, chemical and petroleum product tankers, colliers, naval vessels and passenger ships.
- ❑ Commercial ships less than 10,000 tonnes are assumed to have medium speed engines that use gas oil, while commercial ships greater than 10,000 tonnes are assumed to have slow speed engines that use fuel oil (Environment Australia, 1999a).

Emissions from commercial boats and recreational boats have been separately estimated for the entire GMR and the results are presented in Sections 3.2 and 3.9 respectively. Also, emissions from loading and unloading petroleum products from commercial ships have been separately estimated for the entire GMR and the results are presented in Section 3.7.

3.4.2 Emission Estimation Methodology

❑ **Commercial ships in transit along shipping routes – main engines**

Emissions from commercial ships in transit along shipping routes have been estimated using the preferred method (Environment Australia, 1999a), which requires vessel weight and port arrival, berth arrival, berth departure and port departure time data to be obtained from port authorities. The arrival and departure time data are then combined to produce total transit time. Vessel weight and total transit time data have been combined with time based emission factor formulae to estimate emissions for each substance.

Main engine emissions from commercial ships in transit have been calculated using the emission factor formulae and emission factors detailed in Table 3.43 and the formula below.

Table 3.43: Commercial ships – main engine emission factor formulae and emission factors

Pollutant	Main Engine Emission Factor Formulae (kg/hr) [1]				
	Medium Speed ($EF_{i,j}$)		Slow Speed ($EF_{i,j}$)		
CO	$15.32 \times 10^{-3} \times P^{0.68*} \times N$		$0.68 \times 10^{-3} \times P^{1.08} \times N$		
NO_x	$4.25 \times 10^{-3} \times P^{1.15} \times N$		$17.50 \times 10^{-3} \times P \times N$		
TSP	$0.2 \times 10^{-3} \times P$		$1.5 \times 10^{-3} \times P$		
Total VOC	$4.86 \times 10^{-3} \times P^{0.69} \times N$		$0.28 \times 10^{-3} \times P \times N$		
SO_2	Main Engine Emission Factors by Vessel Gross Tonnage (kg/hr) [2,3]				
	< 1,000	1,000 to 5,000	5,000 to 10,000	10,000 to 50,000	> 50,000
	0.432	2.59	35	127	254

[1] Data Source: (Carlton et. al., 1995).
[2] Data Source: (Environment Australia, 1999a).
[3] Commercial ships less than 10,000 tonnes are assumed to have medium speed engines and use gas oil with a sulfur content of 0.5%, while commercial ships greater than 10,000 tonnes have slow speed engines and use fuel oil with a sulfur content of 2.7% (Carlton et. al., 1995).

where:

$EF_{i,j}$	=	Time based emission factor of substance i for main engine type j	(kg/hr)
P	=	Engine Power x Load Factor	(kW)
Engine Power	=	0.374 x Vessel Gross Tonnage [4]	(kW)
Load Factor	=	85% of maximum continuous rating (MCR) [4]	(Factor)
N	=	Number of engines	(Number)

[4] Data Source: (Environment Australia, 1999a).

$$E_{i,j} = EF_{i,j} \times SF_i \times TT_j$$

where:

$E_{i,j}$	=	Emission of substance i from main engine type j	(kg/year)
$EF_{i,j}$	=	Time based emission factor of substance i for main engine type j	(kg/hr)
$SF_{i,}$	=	NO_x, VOC or PM speciation factor of substance i	(%)
TT_j	=	Transit time in shipping route for main engine type j	(hr/year)

- **Commercial ships at anchorage off the coast, berth at port and transit along shipping routes – auxiliary power units**

Emissions from auxiliary power units (APU) at anchorage off the coast, berth at port and transit along shipping routes have been estimated using the NONROAD2005 Model (USEPA, 2005e), which requires engine type, fuel type and operating hours data to be obtained from port authorities. Operating hours data have been calculated from time at anchorage, berth and transit data that have been provided by port authorities. This information has been combined with time based emission factors for APU using the NONROAD2005 Model to estimate emissions of each substance.

Emissions from APU have been calculated using the following formula:

$$E_{i,j} = EF_i \times SF_i \times OT_j \times N_j \text{ x } LF$$

where:

$E_{i,j}$	=	Emission of substance i during mode j	(kg/year)
EF_i	=	Time based emission factor of substance i	(kg/hr)
SF_i	=	NO_x, VOC or PM speciation factor of substance i	(%)
OT_j	=	Operating time in mode j	(hr/year)
N_j	=	Number of engines operating in mode j	(Number)
LF	=	Load factor	(%)

3.4.3 Activity Data

Activity data required for estimating emissions from commercial ships includes shipping logs.

Shipping logs for commercial ships during 2003 have been obtained from the following port authorities:

- Sydney Ports Corporation – Port Botany and Port Jackson (SPC, 2004 & SPC, 2005);
- Newcastle Port Corporation – Port Newcastle (NPC, 2005); and
- Port Kembla Port Corporation – Port Kembla (PKPC, 2005).

The shipping logs supplied by port authorities include the following information:

- *Ship data* - Name of ship, dead weight tonnage (DWT), overall length and ship type;
- *Anchorage data* - The date and time when each ship arrives and anchors off the coast;
- *Port arrival and departure data* – The date and time when each ship arrives and departs from port; and
- *Berth arrival and departure data* – The date and time each ship arrives and departs from berth.

The DWT data for each ship has been used in the formulae described in Section 3.4.2, so that engine power and hence, emission factors for medium and slow speed main engines can be calculated.

Anchorage, and port and berth arrival and departure data for each ship have been processed, so that the time spent in each of the three operating modes can be calculated. The three modes of operation include waiting time at anchorage, transit time along shipping routes and time at berth. This data has been used along with the DWT and APU data to estimate emissions during the three operating modes. It was assumed that both main engines and APU are in use during transit. For cases when the ship is idle at anchorage and berth, it has been assumed the main engines are inactive, while the APU are operating.

Table 3.44 includes the dead weight tonnage, main engine type and number of commercial ships for each port in the GMR based on data obtained from port authorities.

Table 3.44: Commercial ships – dead weight tonnage, main engine type and number during 2003 in the GMR

Dead Weight Tonnage (DWT)	Port							
	Botany [1]		Jackson [1]		Newcastle [2]		Kembla [3]	
	Main Engine Type							
	Medium Speed	Slow Speed	Medium Speed	Slow Speed	Medium Speed	Slow Speed	Medium Speed	Slow Speed
	Number of Commercial Ship Movements							
< 1,000	321	-	42	-	298	-	67	-
1,000 to 5,000	176	-	66	-	64	-	16	-
5,000 to 10,000	242	-	39	-	230	-	46	-
10,000 to 50,000	-	550	-	904	-	602	-	323
> 50,000	-	69	-	175	-	1,610	-	211
Total Engine Type	739	619	147	1,079	592	2,212	129	534
Total Vessels by Port	1,358		1,226		2,804		663	
Total Vessels all Ports	6,051							

[1] Data Source: (SPC, 2004 & SPC, 2005).
[2] Data Source: (NPC, 2005).
[3] Data Source: (PKPC, 2005).

Table 3.45 includes the average waiting, transit and berth times for commercial ships at each port in the GMR based on data obtained from port authorities.

Table 3.45: Commercial ships – average waiting, transit and berth times during 2003 in the GMR

Port											
Botany [1] Average Time (hr) [2]			Jackson [1] Average Time (hr) [2]			Newcastle Average Time (hr) [2]			Kembla Average Time (hr) [2]		
Transit Time	Waiting Time	Berth Time	Transit Time	Waiting Time	Berth Time	Transit Time [3]	Waiting Time [4]	Berth Time [4]	Transit Time [3]	Waiting Time [4]	Berth Time [4]
1.96	3.14	22.35	1.41	11.21	31.75	1.75	7.18	27.05	1.75	7.18	27.05

[1] Data Source: (SPC, 2004 & SPC, 2005).
[2] Note: Transit time includes the time taken to travel from port to berth.
[3] Data Source: (NPC, 2005 & PKPC, 2005).
[4] Data Source: Average of Port Botany and Port Jackson (SPC, 2004 & SPC, 2005).

3.4.4 Emission and Speciation Factors

The emission and speciation factors for all substances from commercial ships are detailed in Table 3.46.

Table 3.46: Emission and speciation factors for all substances from commercial ships

Substance	Activity Type		Emission Factor Source
CO, NO_x[1], SO_2 & Total VOC	Main Engine		(Carlton et. al., 1995) & (Environment Australia, 1999a)
	APU		(USEPA, 2005e)
$PM_{2.5}$, PM_{10} & TSP	Main Engine		(USEPA, 1996), (USEPA, 1996) & (Carlton et. al., 1995)
	APU		(USEPA, 2005e), (USEPA, 2005e) & (Klimont et. al., 2002)
Organic air toxics	Main Engine		Appendix B (ERG, 2003)
	APU		(Pechan, 2006) replacing Profile Number 1201 (USEPA, 2002)
Metal air toxics	Main Engine		Appendix B (ERG, 2003) & (Environment Australia, 1999a)
	APU		Appendix B (ERG, 2003) & (Environment Australia, 1999a)
PAH	Main Engine	PM phase	Appendix B (ERG, 2003)
		VOC phase	(Khalili et. al., 1995)
	APU	PM phase	Appendix D (ERG, 2003)
		VOC phase	(Khalili et. al., 1995)
PCDD/PCDF	Main Engine		NA
	APU		Appendix D (ERG, 2003)
Speciated VOC & Methane	Main Engine		Profile Number 0008 (USEPA, 2002)
	APU		(Pechan, 2006) replacing Profile Number 1201 (USEPA, 2002)

[1] The default NO_x speciation profile used in the inventory is 5% NO_2 and 95% NO (USEPA, 2005a).

3.4.5 Spatial Distribution of Emissions

Emissions from commercial ships have been spatially distributed to each 1 km by 1 km grid cell as follows:

- *Transit outside ports* – assigned to grid cells according to a probabilistic spatial distribution. This is discussed in further detail below;
- *Waiting outside ports* - assigned to grid cells from port entrance to ~28 km from port entrance;
- *Transit inside ports* – assigned to grid cells that correspond with shipping routes; and
- *Berth* – assigned to grid cells where the port is located.

❑ Transit outside ports

All commercial ships in the GMR travel through four ports, which include: Port Newcastle; Port Jackson; Port Botany; and Port Kembla. Port authorities advise there are no preferred or usual routes that ships use when arriving and departing from a port. Therefore, a probabilistic spatial distribution of emissions has been developed, with each ship being treated as equally likely to travel in any direction. Emissions associated with ship transit outside ports have been spatially distributed using the model outlined below.

Since the off-road mobile air emissions inventory is based on a 1 km by 1 km grid cell system, the spatial distribution of commercial ship emissions is also based on square layers but each layer increases in size. From a particular single 1 x 1 km grid cell, progressively larger squares of grid cells are used. That is, after the first single grid cell, a square of 3 x 3 grid cells, followed by a square of 5 x 5 grid cells, 7 x 7 grid cells, and 9 x 9 grid cells, etc., are used (but only the cells along the perimeter of the square). All ships must cross each square layer in turn since they travel to and from the port outside the GMR. With the assumption that each ship takes the same time to cross each grid cell, 100% of each port’s emissions will occur in each square layer. This is only dependent on the grid cell size and the ship’s average speed, both of which are fixed. The spatial distribution of emissions are inversely proportional to the distance squared for grid cells between lines connecting a port with the north eastern and southern exit points. For grid cells outside those lines, the spatial distributions of emissions are inversely proportional to the distance squared and a Gaussian distribution. After the emissions for each of the four ports have been calculated for each grid cell, the results are summed, giving the total emissions for all four ports in each grid cell.

In developing this model, the following assumptions have been made:

- All commercial ships arrive and depart from one of the four ports;
- An exclusion zone of ~8 km from the coast has been assumed, which is based on the minimum distance for safety;
- Since commercial ships are used for large scale trade, they are less likely to follow the coastline and will more likely travel directly between one of the four ports and other distant destinations. Therefore, two points have been chosen at the extremes of the GMR between which the ships pass as they depart. One point is east of Newcastle and the other approximately south of Wollongong. The geography of the GMR coast dictated the locations of these two points; and
- It can be considered that as commercial ships are in transit they ‘radiate’ outwards from a port. In terms of emissions estimation, the direction of travel is irrelevant because the same emissions are produced when ships arrive and depart, all other factors being equal. Therefore for a given grid cell, the emissions are inversely proportional to the square of the distance from the port.

Figure 3.10 shows the spatial distribution of commercial ships in the GMR.

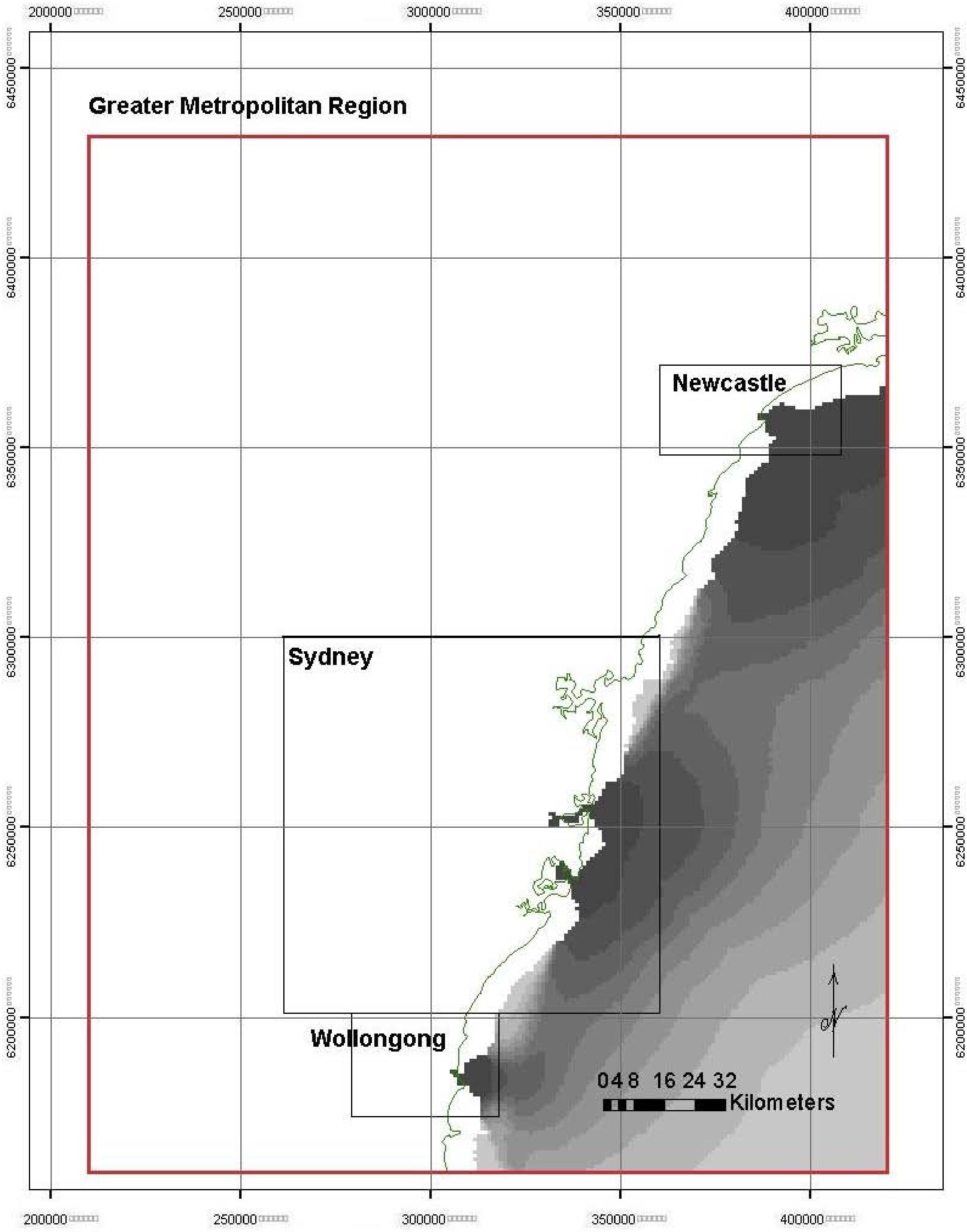

Figure 3.10: Spatial distribution of commercial ships in the GMR

3.4.6 Temporal Variation of Emissions

The following temporal emissions variation profiles have been used for commercial ships:

- Monthly - assumed to vary for each month of the year (SPC, 2004; SPC, 2005; NPC, 2005; & PKPC, 2005);
- Weekly (i.e. Weekday and Weekend day) - assumed to be ~1.07 times higher on weekdays compared with weekend days (SPC, 2004; SPC, 2005; NPC, 2005; & PKPC, 2005); and
- Daily – assumed to vary for each hour of the day (SPC, 2004; SPC, 2005; NPC, 2005; & PKPC, 2005).

Tables 3.47, 3.48 and 3.49 detail the temporal emissions variation profiles that have been used for commercial ships.

Table 3.47: Monthly temporal emissions variation profile for commercial ships

Month	Monthly Temporal Factor		Month	Monthly Temporal Factor	
January	1.06	8.06%	July	1.05	7.98%
February	1.00	7.60%	August	1.17	8.90%
March	1.11	8.44%	September	1.05	7.98%
April	1.09	8.29%	October	1.20	9.13%
May	1.12	8.52%	November	1.10	8.37%
June	1.06	8.06%	December	1.14	8.67%

Table 3.48: Weekly temporal emissions variation profile for commercial ships

Day Type	Weekly Temporal Factor		Day Type	Weekly Temporal Factor	
Weekday	5.00	72.81%	Weekend day	1.87	27.19%

Table 3.49: Daily temporal emissions variation profile for commercial ships

Hour	Weekday Temporal Factor		Weekend day Temporal Factor		Hour	Weekday Temporal Factor		Weekend day Temporal Factor	
1 am	1.10	2.43%	1.10	2.43%	1 pm	2.26	4.99%	2.26	4.99%
2 am	1.35	2.98%	1.35	2.98%	2 pm	2.08	4.59%	2.08	4.59%
3 am	1.03	2.27%	1.03	2.27%	3 pm	1.97	4.35%	1.97	4.35%
4 am	1.00	2.21%	1.00	2.21%	4 pm	2.41	5.32%	2.41	5.32%
5 am	1.58	3.49%	1.58	3.49%	5 pm	2.01	4.44%	2.01	4.44%
6 am	2.16	4.77%	2.16	4.77%	6 pm	1.61	3.55%	1.61	3.55%
7 am	2.54	5.61%	2.54	5.61%	7 pm	1.73	3.82%	1.73	3.82%
8 am	2.70	5.96%	2.70	5.96%	8 pm	1.61	3.55%	1.61	3.55%
9 am	2.78	6.14%	2.78	6.14%	9 pm	1.54	3.40%	1.54	3.40%
10 am	2.63	5.81%	2.63	5.81%	10 pm	1.49	3.29%	1.49	3.29%
11 am	2.58	5.70%	2.58	5.70%	11 pm	1.57	3.47%	1.57	3.47%
12 noon	2.21	4.88%	2.21	4.88%	12 midnight	1.36	3.00%	1.36	3.00%

3.4.7 Emission Estimates

Table 3.50 presents total estimated annual emissions (for selected substances) from commercial ships for the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions. Total estimated annual emissions of all substances from commercial ships are presented in Appendix C.

Table 3.50: Total estimated annual emissions from commercial ships in each region

Substance	Emissions (tonnes/year)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	1.41	2.12	3.80×10^{-01}	1.52	5.44
ACETALDEHYDE	$1.03 \times 10^{+01}$	$1.54 \times 10^{+01}$	2.77	$1.11 \times 10^{+01}$	$3.95 \times 10^{+01}$
BENZENE	1.00	1.50	2.70×10^{-01}	1.08	3.86
CARBON MONOXIDE	$2.72 \times 10^{+02}$	$4.08 \times 10^{+02}$	$7.33 \times 10^{+01}$	$2.93 \times 10^{+02}$	$1.05 \times 10^{+03}$
FORMALDEHYDE	7.82	$1.17 \times 10^{+01}$	2.11	8.42	$3.01 \times 10^{+01}$
ISOMERS OF XYLENE	7.59×10^{-01}	1.14	2.04×10^{-01}	8.17×10^{-01}	2.92
LEAD AND COMPOUNDS	1.03×10^{-03}	1.55×10^{-03}	2.78×10^{-04}	1.11×10^{-03}	3.97×10^{-03}
OXIDES OF NITROGEN	$1.61 \times 10^{+03}$	$2.41 \times 10^{+03}$	$4.32 \times 10^{+02}$	$1.73 \times 10^{+03}$	$6.18 \times 10^{+03}$
PARTICULATE MATTER < 10 µm	$5.55 \times 10^{+01}$	$8.32 \times 10^{+01}$	$1.49 \times 10^{+01}$	$5.98 \times 10^{+01}$	$2.13 \times 10^{+02}$
PARTICULATE MATTER < 2.5 µm	$5.31 \times 10^{+01}$	$7.96 \times 10^{+01}$	$1.43 \times 10^{+01}$	$5.72 \times 10^{+01}$	$2.04 \times 10^{+02}$
POLYCYCLIC AROMATIC HYDROCARBONS	5.15×10^{-01}	7.72×10^{-01}	1.39×10^{-01}	5.54×10^{-01}	1.98
SULFUR DIOXIDE	$8.18 \times 10^{+02}$	$1.23 \times 10^{+03}$	$2.20 \times 10^{+02}$	$8.81 \times 10^{+02}$	$3.15 \times 10^{+03}$
TETRACHLOROETHYLENE	-	-	-	-	-
TOLUENE	8.95×10^{-01}	1.34	2.41×10^{-01}	9.64×10^{-01}	3.44
TOTAL SUSPENDED PARTICULATES	$5.84 \times 10^{+01}$	$8.76 \times 10^{+01}$	$1.57 \times 10^{+01}$	$6.29 \times 10^{+01}$	$2.25 \times 10^{+02}$
TOTAL VOCS	$5.98 \times 10^{+01}$	$8.97 \times 10^{+01}$	$1.61 \times 10^{+01}$	$6.44 \times 10^{+01}$	$2.30 \times 10^{+02}$
TRICHLOROETHYLENE	-	-	-	-	-

Tables 3.51, 3.52, 3.53 and 3.54 present total estimated daily emissions (for selected substances) from commercial ships for the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions. These estimates are representative of typical January weekday, January weekend day, July weekday and July weekend day daily emissions.

Table 3.51: Total estimated daily emissions from commercial ships in each region for typical January weekday

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	3.61×10^{-03}	5.41×10^{-03}	9.71×10^{-04}	3.88×10^{-03}	1.39×10^{-02}
ACETALDEHYDE	2.62×10^{-02}	3.93×10^{-02}	7.06×10^{-03}	2.82×10^{-02}	1.01×10^{-01}
BENZENE	2.56×10^{-03}	3.84×10^{-03}	6.89×10^{-04}	2.76×10^{-03}	9.84×10^{-03}
CARBON MONOXIDE	6.95×10^{-01}	1.04	1.87×10^{-01}	7.48×10^{-01}	2.67
FORMALDEHYDE	2.00×10^{-02}	2.99×10^{-02}	5.37×10^{-03}	2.15×10^{-02}	7.68×10^{-02}
ISOMERS OF XYLENE	1.94×10^{-03}	2.91×10^{-03}	5.21×10^{-04}	2.09×10^{-03}	7.45×10^{-03}
LEAD AND COMPOUNDS	2.63×10^{-06}	3.95×10^{-06}	7.09×10^{-07}	2.84×10^{-06}	1.01×10^{-05}
OXIDES OF NITROGEN	4.10	6.15	1.10	4.41	$1.58 \times 10^{+01}$
PARTICULATE MATTER < 10 µm	1.42×10^{-01}	2.12×10^{-01}	3.81×10^{-02}	1.52×10^{-01}	5.45×10^{-01}
PARTICULATE MATTER < 2.5 µm	1.35×10^{-01}	2.03×10^{-01}	3.65×10^{-02}	1.46×10^{-01}	5.21×10^{-01}
POLYCYCLIC AROMATIC HYDROCARBONS	1.31×10^{-03}	1.97×10^{-03}	3.54×10^{-04}	1.41×10^{-03}	5.05×10^{-03}
SULFUR DIOXIDE	2.09	3.13	5.62×10^{-01}	2.25	8.03
TETRACHLOROETHYLENE	-	-	-	-	-
TOLUENE	2.28×10^{-03}	3.43×10^{-03}	6.15×10^{-04}	2.46×10^{-03}	8.79×10^{-03}
TOTAL SUSPENDED PARTICULATES	1.49×10^{-01}	2.24×10^{-01}	4.01×10^{-02}	1.60×10^{-01}	5.73×10^{-01}
TOTAL VOCS	1.53×10^{-01}	2.29×10^{-01}	4.11×10^{-02}	1.64×10^{-01}	5.87×10^{-01}
TRICHLOROETHYLENE	-	-	-	-	-

Table 3.52: Total estimated daily emissions from commercial ships in each region for typical January weekend day

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	3.87×10^{-03}	5.81×10^{-03}	1.04×10^{-03}	4.17×10^{-03}	1.49×10^{-02}
ACETALDEHYDE	2.81×10^{-02}	4.22×10^{-02}	7.58×10^{-03}	3.03×10^{-02}	1.08×10^{-01}
BENZENE	2.75×10^{-03}	4.12×10^{-03}	7.40×10^{-04}	2.96×10^{-03}	1.06×10^{-02}
CARBON MONOXIDE	7.46×10^{-01}	1.12	2.01×10^{-01}	8.03×10^{-01}	2.87
FORMALDEHYDE	2.14×10^{-02}	3.21×10^{-02}	5.77×10^{-03}	2.31×10^{-02}	8.24×10^{-02}
ISOMERS OF XYLENE	2.08×10^{-03}	3.12×10^{-03}	5.60×10^{-04}	2.24×10^{-03}	8.00×10^{-03}
LEAD AND COMPOUNDS	2.83×10^{-06}	4.24×10^{-06}	7.61×10^{-07}	3.05×10^{-06}	1.09×10^{-05}
OXIDES OF NITROGEN	4.40	6.60	1.18	4.74	$1.69 \times 10^{+01}$
PARTICULATE MATTER < 10 µm	1.52×10^{-01}	2.28×10^{-01}	4.09×10^{-02}	1.64×10^{-01}	5.85×10^{-01}
PARTICULATE MATTER < 2.5 µm	1.45×10^{-01}	2.18×10^{-01}	3.92×10^{-02}	1.57×10^{-01}	5.59×10^{-01}
POLYCYCLIC AROMATIC HYDROCARBONS	1.41×10^{-03}	2.12×10^{-03}	3.80×10^{-04}	1.52×10^{-03}	5.42×10^{-03}
SULFUR DIOXIDE	2.24	3.36	6.04×10^{-01}	2.41	8.62
TETRACHLOROETHYLENE	-	-	-	-	-
TOLUENE	2.45×10^{-03}	3.68×10^{-03}	6.61×10^{-04}	2.64×10^{-03}	9.44×10^{-03}
TOTAL SUSPENDED PARTICULATES	1.60×10^{-01}	2.40×10^{-01}	4.31×10^{-02}	1.72×10^{-01}	6.16×10^{-01}
TOTAL VOCS	1.64×10^{-01}	2.46×10^{-01}	4.41×10^{-02}	1.76×10^{-01}	6.30×10^{-01}
TRICHLOROETHYLENE	-	-	-	-	-

Table 3.53: Total estimated daily emissions from commercial ships in each region for typical July weekday

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	3.57×10^{-03}	5.36×10^{-03}	9.62×10^{-04}	3.85×10^{-03}	1.37×10^{-02}
ACETALDEHYDE	2.60×10^{-02}	3.89×10^{-02}	6.99×10^{-03}	2.80×10^{-02}	9.98×10^{-02}
BENZENE	2.53×10^{-03}	3.80×10^{-03}	6.82×10^{-04}	2.73×10^{-03}	9.75×10^{-03}
CARBON MONOXIDE	6.88×10^{-01}	1.03	1.85×10^{-01}	7.41×10^{-01}	2.65
FORMALDEHYDE	1.98×10^{-02}	2.97×10^{-02}	5.32×10^{-03}	2.13×10^{-02}	7.60×10^{-02}
ISOMERS OF XYLENE	1.92×10^{-03}	2.88×10^{-03}	5.17×10^{-04}	2.07×10^{-03}	7.38×10^{-03}
LEAD AND COMPOUNDS	2.61×10^{-06}	3.91×10^{-06}	7.02×10^{-07}	2.81×10^{-06}	1.00×10^{-05}
OXIDES OF NITROGEN	4.06	6.09	1.09	4.37	$1.56 \times 10^{+01}$
PARTICULATE MATTER < 10 µm	1.40×10^{-01}	2.10×10^{-01}	3.78×10^{-02}	1.51×10^{-01}	5.39×10^{-01}
PARTICULATE MATTER < 2.5 µm	1.34×10^{-01}	2.01×10^{-01}	3.61×10^{-02}	1.44×10^{-01}	5.16×10^{-01}
POLYCYCLIC AROMATIC HYDROCARBONS	1.30×10^{-03}	1.95×10^{-03}	3.50×10^{-04}	1.40×10^{-03}	5.00×10^{-03}
SULFUR DIOXIDE	2.07	3.10	5.57×10^{-01}	2.23	7.96
TETRACHLOROETHYLENE	-	-	-	-	-
TOLUENE	2.26×10^{-03}	3.39×10^{-03}	6.09×10^{-04}	2.44×10^{-03}	8.70×10^{-03}
TOTAL SUSPENDED PARTICULATES	1.48×10^{-01}	2.21×10^{-01}	3.97×10^{-02}	1.59×10^{-01}	5.68×10^{-01}
TOTAL VOCS	1.51×10^{-01}	2.27×10^{-01}	4.07×10^{-02}	1.63×10^{-01}	5.81×10^{-01}
TRICHLOROETHYLENE	-	-	-	-	-

Table 3.54: Total estimated daily emissions from commercial ships in each region for typical July weekend day

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	3.84×10^{-03}	5.75×10^{-03}	1.03×10^{-03}	4.13×10^{-03}	1.48×10^{-02}
ACETALDEHYDE	2.79×10^{-02}	4.18×10^{-02}	7.51×10^{-03}	3.00×10^{-02}	1.07×10^{-01}
BENZENE	2.72×10^{-03}	4.08×10^{-03}	7.33×10^{-04}	2.93×10^{-03}	1.05×10^{-02}
CARBON MONOXIDE	7.39×10^{-01}	1.11	1.99×10^{-01}	7.96×10^{-01}	2.84
FORMALDEHYDE	2.12×10^{-02}	3.18×10^{-02}	5.72×10^{-03}	2.29×10^{-02}	8.17×10^{-02}
ISOMERS OF XYLENE	2.06×10^{-03}	3.09×10^{-03}	5.55×10^{-04}	2.22×10^{-03}	7.92×10^{-03}
LEAD AND COMPOUNDS	2.80×10^{-06}	4.20×10^{-06}	7.54×10^{-07}	3.02×10^{-06}	1.08×10^{-05}
OXIDES OF NITROGEN	4.36	6.54	1.17	4.69	$1.68 \times 10^{+01}$
PARTICULATE MATTER < 10 µm	1.51×10^{-01}	2.26×10^{-01}	4.05×10^{-02}	1.62×10^{-01}	5.79×10^{-01}
PARTICULATE MATTER < 2.5 µm	1.44×10^{-01}	2.16×10^{-01}	3.88×10^{-02}	1.55×10^{-01}	5.54×10^{-01}
POLYCYCLIC AROMATIC HYDROCARBONS	1.40×10^{-03}	2.10×10^{-03}	3.76×10^{-04}	1.50×10^{-03}	5.37×10^{-03}
SULFUR DIOXIDE	2.22	3.33	5.98×10^{-01}	2.39	8.54
TETRACHLOROETHYLENE	-	-	-	-	-
TOLUENE	2.43×10^{-03}	3.65×10^{-03}	6.54×10^{-04}	2.62×10^{-03}	9.35×10^{-03}
TOTAL SUSPENDED PARTICULATES	1.59×10^{-01}	2.38×10^{-01}	4.27×10^{-02}	1.71×10^{-01}	6.10×10^{-01}
TOTAL VOCS	1.62×10^{-01}	2.43×10^{-01}	4.37×10^{-02}	1.75×10^{-01}	6.24×10^{-01}
TRICHLOROETHYLENE	-	-	-	-	-

3.4.8 Emission Projection Methodology

Emission projection factors for commercial ships use international water transport oil consumption growth as the surrogate. Emission projection factors for commercial ships have been developed using the following data:

- ❑ International water transport oil consumption growth data (ABARE, 2005b).

Emission projection factors have been developed for every year from 2004 to 2031 (emissions for the base year 2003 are based on the activity data obtained coupled with the emission estimation techniques). Table 3.55 presents the emission projection factors for commercial ships.

Table 3.55: Emission projection factors for commercial ships

Year	Emission Projection Factors [1]	Year	Emission Projection Factors [1]
2004	1.0051	2018	1.0800
2005	1.0103	2019	1.0856
2006	1.0155	2020	1.0912
2007	1.0207	2021	1.0968
2008	1.0260	2022	1.1024
2009	1.0313	2023	1.1081
2010	1.0366	2024	1.1138
2011	1.0419	2025	1.1196
2012	1.0473	2026	1.1253
2013	1.0527	2027	1.1311
2014	1.0581	2028	1.1369
2015	1.0635	2029	1.1428
2016	1.0690	2030	1.1487
2017	1.0745	2031	1.1546

[1] Data Source: (ABARE, 2005b), http://www.abareconomics.com/data_services/excel/TPEC 05.xls?prodid=13183.

3.5 Construction Off-Road Vehicles and Equipment

3.5.1 Emission Source Description

Emissions of combustion products from construction off-road vehicles and equipment arise from the use of unregistered 2-stroke petrol, 4-stroke petrol, compressed natural gas (CNG), diesel and liquefied petroleum gas (LPG) engines on construction sites. Construction sites include activities that are not scheduled under the Protection of the Environment (Operations) Act 1997 and therefore not required to hold an Environment Protection License. The off-road mobile air emissions inventory includes the following types of construction off-road vehicles and equipment:

- Concrete and industrial saws;
- Cranes;
- Crushing and processing equipment;
- Excavators;
- Forklifts;
- Graders;
- Off-highway tractors;
- Off-highway trucks;
- Other construction equipment
- Plate compactors;
- Rollers;
- Rubber tyre Loaders;
- Skid steer loaders;
- Tampers and rammers;
- Tractors, loaders and backhoes; and
- Trenchers.

Emissions from commercial and industrial off-road vehicles and equipment have been separately estimated for the entire GMR and the results are presented in Sections 3.3 and 3.6 respectively.

3.5.2 Emission Estimation Methodology

Exhaust emissions from construction off-road vehicles and equipment have been estimated using the NONROAD2005 Model (USEPA, 2005e), which requires vehicle and equipment type, fuel type, operating hours and area of operation data to be obtained from a survey of construction and equipment hire companies. Operating hours data for each vehicle/equipment and fuel type have been combined with time based emission factors to estimate emissions for each substance.

The NONROAD2005 Model estimates exhaust emissions for each specific type of construction off-road vehicle and equipment using the following input data estimates:

- Vehicle population for base year, distributed by age, power, fuel type, and application;
- Average load factor expressed as average fraction of available power;
- Available power in horsepower;
- Activity in hours of use per year; and
- Emission factor with deterioration and/or new standards.

Exhaust emissions from construction off-road vehicles and equipment have been calculated using the following formula:

$$E_{i,j,k} = EF_{i,j,k} \times SF_{i,j,k} \times OT_{j,k} \times N_{j,k} \text{ x } LF_{j,k}$$

where:

$E_{i,j,k}$	=	Emission of substance i from fuel type j and construction off-road vehicle/equipment type k	(kg/year)
$EF_{i,j,k}$	=	Time based emission factor of substance i for fuel type j and construction off-road vehicle/equipment type k	(kg/hr)
$SF_{i,j,k}$	=	NO_x, VOC or PM speciation factor of substance i for fuel type j and construction off-road vehicle/equipment type k	(%)
$OT_{j,k}$	=	Operating time for fuel type j and construction off-road vehicle/equipment type k	(hr/year)
$N_{j,k}$	=	Number with fuel type j and construction off-road vehicle/equipment type k	(Number)
$LF_{j,k}$	=	Load factor for fuel type j and construction off-road vehicle/equipment type k	(%)

3.5.3 Activity Data

A survey of construction and equipment hire companies was conducted during 2005 to obtain activity data for construction off-road vehicles and equipment. The purpose of the survey was to obtain sufficient data so that emissions of combustion products could be estimated from the use of unregistered 2-stroke petrol, 4-stroke petrol, CNG, diesel and LPG engines on construction sites. The following activity data was collected through the survey:

- Off-road vehicle/equipment operating location;
- Number and type of vehicle/equipment;
- Vehicle/equipment year and model;
- Engine size or power rating and fuel type;
- Fuel usage; and
- Operating time, frequency and duration.

A sample survey questionnaire form used to collect activity data is presented in Appendix A.

Activity data required for estimating emissions from construction off-road vehicles and equipment includes:

- Area of operation (Tseng et. al., 2006b);
- Population, engine power and fuel type (Tseng et. al., 2006b);
- Average load factor expressed as average fraction of available power (USEPA, 2004c);
- Activity in hours of use per year (Tseng et. al., 2006b); and
- 1 km by 1 km gridded population data for the GMR (ABS, 2001 & TPDC, 2004). The total population in the GMR during 2003 was 5,091,366.

Based on the survey, activity data was obtained for 43 construction sites, which includes 777 construction off-road vehicles and equipment.

Table 3.56 includes the type and number of construction off-road vehicles and equipment in the GMR based on the 43 construction sites where activity data was obtained through the survey.

Table 3.56: Construction off-road vehicles and equipment – vehicle/equipment type and number during 2003 in the GMR

Vehicle/Equipment Type [1]	Number of Vehicles/Equipment [1]
Concrete and industrial saws	21
Cranes	6
Crushing and processing equipment	1
Excavators	145
Forklifts	8
Graders	10
Off-highway tractors	8
Off-highway trucks	3
Other construction equipment	23
Plate compactors	182
Rollers	146
Rubber tyre loaders	74
Skid steer loaders	32
Tampers and rammers	84
Tractors, loaders and backhoes	12
Trenchers	22
Total Construction Off-Road Vehicles and Equipment	777

[1] Data Source: (Tseng et. al., 2006b).

Table 3.57 includes the number of construction off-road vehicles and equipment with a given fuel type in the GMR based on the 43 construction sites where activity data was obtained through the survey.

Table 3.57: Construction off-road vehicles and equipment – fuel type and number during 2003 in the GMR

Fuel Type [1]	Number Of Vehicles/Equipment [1]
2-stroke petrol	174
4-stroke petrol	192
CNG	1
Diesel	403
LPG	7
Total Construction Off-Road Vehicles and Equipment	777

[1] Data Source: (Tseng et. al., 2006b).

Table 3.58 includes the number of construction off-road vehicles and equipment with a given engine power range in the GMR based on the 43 construction sites where activity data was obtained through the survey.

Table 3.58: Construction off-road vehicles and equipment – engine power range and number during 2003 in the GMR

Engine Power Range (kW) [1]	Number of 2-Stroke Petrol Vehicles/ Equipment [1]	Number of 4-Stroke Petrol Vehicles/ Equipment [1]	Number of CNG Vehicles/ Equipment [1]	Number of Diesel Vehicles/ Equipment [1]	Number of LPG Vehicles/ Equipment [1]
< 5	174	113	-	-	-
6 to 10	-	-	-	1	-
11 to 20	-	21	-	42	-
21 to 50	-	43	-	66	-
51 to 100	-	-	-	70	-
101 to 200	-	14	1	163	7
> 200 kW	-	-	-	61	-
Total Fuel Type	174	192	1	403	7
Total Vehicles and Equipment	777				

[1] Data Source: (Tseng et. al., 2006b).

Figure 3.11 shows the proportion of construction off-road vehicles and equipment with a given fuel type and engine power range in the GMR based on the 43 construction sites where activity data was obtained through the survey.

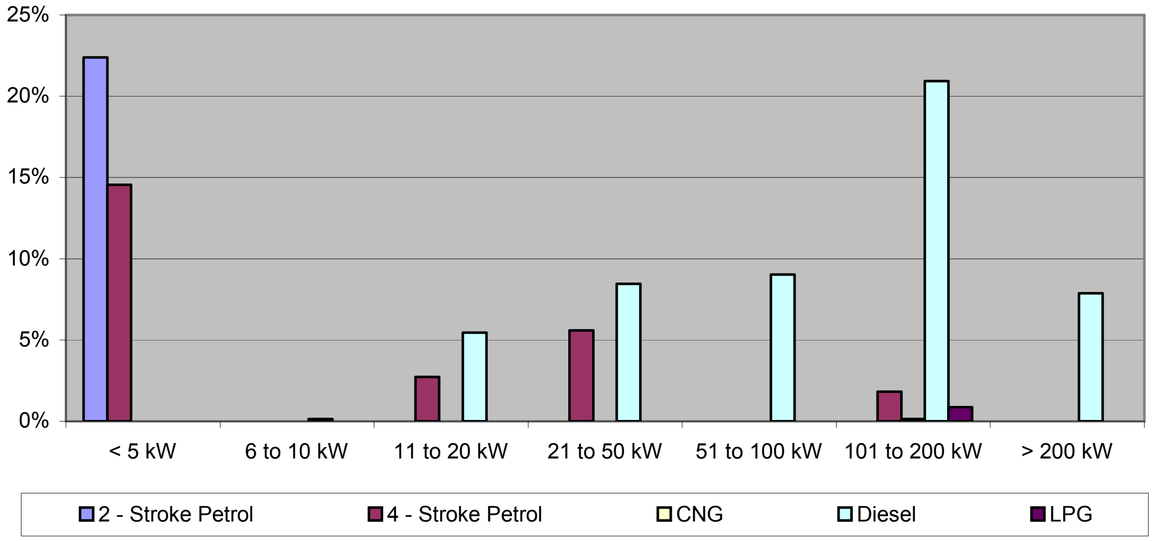

Figure 3.11: Proportion of fuel type and engine power range for construction off-road vehicles and equipment during 2003 in the GMR

3.5.4 Emission and Speciation Factors

The emission and speciation factors for all substances from construction off-road vehicles and equipment exhaust are detailed in Table 3.59.

Table 3.59: Emission and speciation factors for all substances from construction off-road vehicles and equipment exhaust

<table>
<tr><th>Substance</th><th colspan="2">Fuel Type</th><th>Emission Factor Source</th></tr>
<tr><td>CO, NO_x[1], $PM_{2.5}$, PM_{10}, SO_2 & Total VOC</td><td colspan="2">All</td><td>(USEPA, 2005e)</td></tr>
<tr><td rowspan="3">TSP</td><td colspan="2">2-stroke & 4-stroke petrol</td><td>(Norbeck et. al., 1998)</td></tr>
<tr><td colspan="2">Diesel</td><td>(Klimont et. al., 2002)</td></tr>
<tr><td colspan="2">CNG & LPG</td><td>(Norbeck et. al., 1998)</td></tr>
<tr><td rowspan="3">Organic air toxics</td><td colspan="2">2-stroke & 4-stroke petrol</td><td>Appendix D (ERG, 2003)</td></tr>
<tr><td colspan="2">Diesel</td><td>(Pechan, 2006) replacing Profile Number 1201 (USEPA, 2002)</td></tr>
<tr><td colspan="2">CNG & LPG</td><td>(Environment Australia, 2000)</td></tr>
<tr><td>Metal air toxics</td><td colspan="2">All</td><td>(Environment Australia, 2000)</td></tr>
<tr><td rowspan="3">PAH</td><td rowspan="2">2-stroke & 4-stroke petrol & Diesel</td><td>PM phase</td><td>Appendix D (ERG, 2003)</td></tr>
<tr><td>VOC phase</td><td>(Khalili et. al., 1995)</td></tr>
<tr><td colspan="2">CNG & LPG</td><td>NA</td></tr>
<tr><td rowspan="2">PCDD/PCDF</td><td colspan="2">2-stroke & 4-stroke petrol & Diesel</td><td>Appendix D (ERG, 2003)</td></tr>
<tr><td colspan="2">CNG & LPG</td><td>NA</td></tr>
<tr><td rowspan="3">Speciated VOC & Methane</td><td colspan="2">2-stroke & 4-stroke petrol [2]</td><td>Profile Number 1203 (USEPA, 2002)</td></tr>
<tr><td colspan="2">Diesel</td><td>(Pechan, 2006) replacing Profile Number 1201 (USEPA, 2002)</td></tr>
<tr><td colspan="2">CNG & LPG</td><td>Profile Number 1001 (USEPA, 2002)</td></tr>
</table>

[1] The default NO_x speciation profile used in the inventory is 5 % NO_2 and 95% NO (USEPA, 2005a).
[2] Profile Number 0000 (USEPA, 2002) for "Unidentified" VOC.

3.5.5 Spatial Distribution of Emissions

Emissions from construction off-road vehicles and equipment have been spatially distributed according to the number of building approvals in each Local Government Area (LGA) during 2003 (ABS, 2005). Population data (ABS, 2001 & TPDC, 2004) were used to identify each 1 km by 1 km grid cell with a population of equal to or greater than 5. Total emissions of each substance have been spatially distributed to each 1 km by 1 km grid cell within the GMR in proportion to the number of building approvals during 2003. Figure 3.12 shows the spatial distribution of construction off-road vehicles and equipment in the GMR.

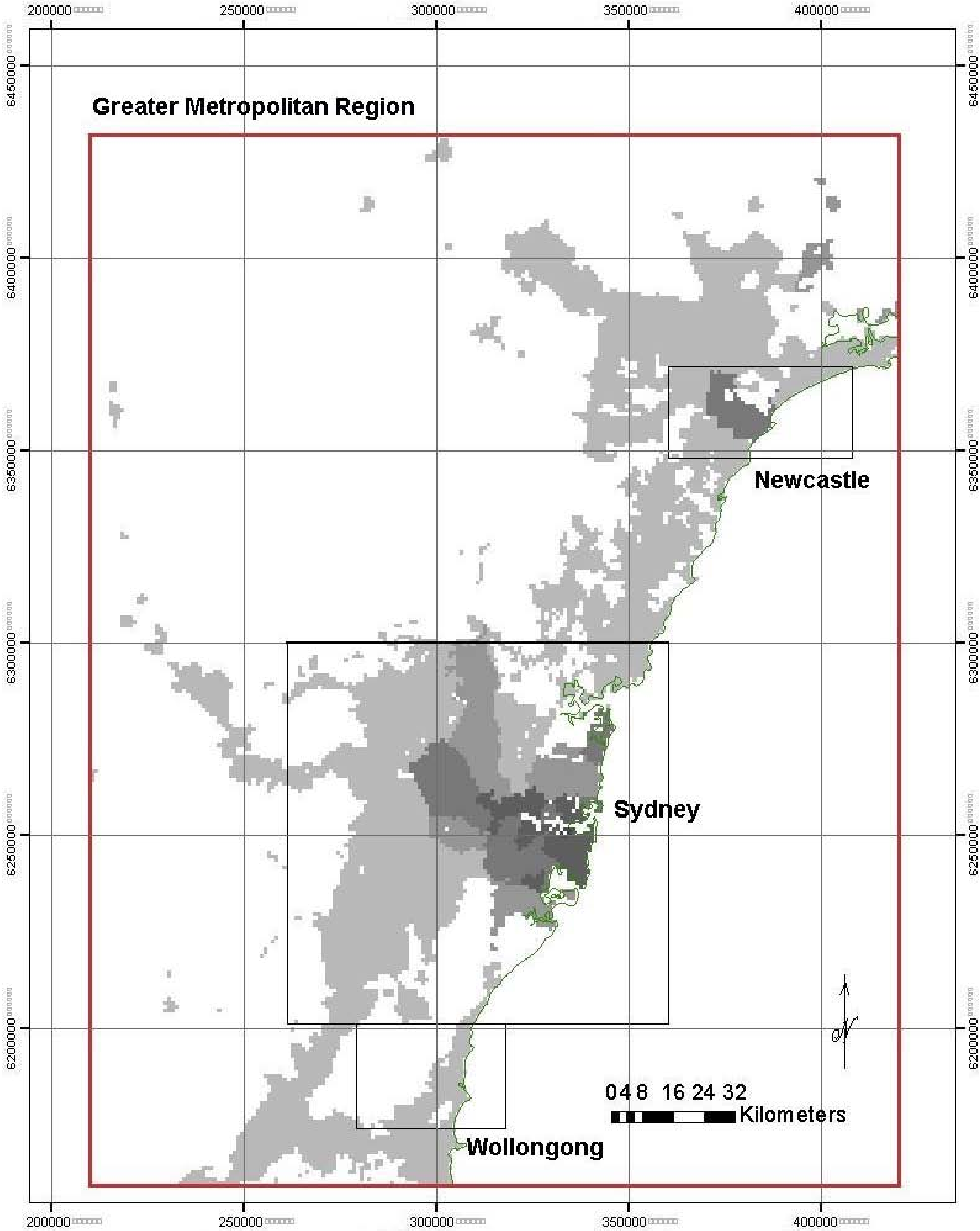

Figure 3.12: Spatial distribution of construction off-road vehicles and equipment in the GMR

3.5.6 Temporal Variation of Emissions

- Monthly - assumed to be constant for each month of the year (ABS, 2005);
- Weekly (i.e. Weekday and Weekend day) - assumed to be ~1.75 times higher on weekdays compared with weekend days (Tseng et. al., 2006b); and
- Daily – assumed to be constant between 8 am and 5 pm (Tseng et. al., 2006b).

Tables 3.60, 3.61 and 3.62 detail the temporal emissions variation profiles that have been used for construction off-road vehicles and equipment.

Table 3.60: Monthly temporal emissions variation profile for construction off-road vehicles and equipment

Month	Monthly Temporal Factor		Month	Monthly Temporal Factor	
January	1	8.33%	July	1	8.33%
February	1	8.33%	August	1	8.33%
March	1	8.33%	September	1	8.33%
April	1	8.33%	October	1	8.33%
May	1	8.33%	November	1	8.33%
June	1	8.33%	December	1	8.33%

Table 3.61: Weekly temporal emissions variation profile for construction off-road vehicles and equipment

Day Type	Weekly Temporal Factor		Day Type	Weekly Temporal Factor	
Weekday	5.00	81.43%	Weekend day	1.14	18.57%

Table 3.62: Daily temporal emissions variation profile for construction off-road vehicles and equipment

Hour	Weekday Temporal Factor		Weekend day Temporal Factor		Hour	Weekday Temporal Factor		Weekend day Temporal Factor	
1 am	0	0.00%	0	0.00%	1 pm	1	11.11%	1	11.11%
2 am	0	0.00%	0	0.00%	2 pm	1	11.11%	1	11.11%
3 am	0	0.00%	0	0.00%	3 pm	1	11.11%	1	11.11%
4 am	0	0.00%	0	0.00%	4 pm	1	11.11%	1	11.11%
5 am	0	0.00%	0	0.00%	5 pm	0	0.00%	0	0.00%
6 am	0	0.00%	0	0.00%	6 pm	0	0.00%	0	0.00%
7 am	0	0.00%	0	0.00%	7 pm	0	0.00%	0	0.00%
8 am	1	11.11%	1	11.11%	8 pm	0	0.00%	0	0.00%
9 am	1	11.11%	1	11.11%	9 pm	0	0.00%	0	0.00%
10 am	1	11.11%	1	11.11%	10 pm	0	0.00%	0	0.00%
11 am	1	11.11%	1	11.11%	11 pm	0	0.00%	0	0.00%
12 noon	1	11.11%	1	11.11%	12 midnight	0	0.00%	0	0.00%

3.5.7 Emission Estimates

Table 3.63 presents total estimated annual emissions (for selected substances) from construction off-road vehicles and equipment for the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions. Total estimated annual emissions of all substances from construction off-road vehicles and equipment are presented in Appendix C.

Table 3.63: Total estimated annual emissions from construction off-road vehicles and equipment in each region

Substance	Emissions (tonnes/year)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	1.40×10^{-01}	1.04×10^{-02}	3.77×10^{-03}	2.47×10^{-02}	1.79×10^{-01}
ACETALDEHYDE	2.98	2.21×10^{-01}	8.00×10^{-02}	5.26×10^{-01}	3.81
BENZENE	1.34	9.95×10^{-02}	3.60×10^{-02}	2.37×10^{-01}	1.72
CARBON MONOXIDE	$5.91 \times 10^{+02}$	$4.38 \times 10^{+01}$	$1.59 \times 10^{+01}$	$1.04 \times 10^{+02}$	$7.55 \times 10^{+02}$
FORMALDEHYDE	1.72	1.27×10^{-01}	4.60×10^{-02}	3.02×10^{-01}	2.19
ISOMERS OF XYLENE	4.52	3.34×10^{-01}	1.21×10^{-01}	7.96×10^{-01}	5.77
LEAD AND COMPOUNDS	1.86×10^{-03}	1.38×10^{-04}	4.98×10^{-05}	3.27×10^{-04}	2.37×10^{-03}
OXIDES OF NITROGEN	$1.71 \times 10^{+02}$	$1.27 \times 10^{+01}$	4.59	$3.01 \times 10^{+01}$	$2.18 \times 10^{+02}$
PARTICULATE MATTER < 10 µm	$1.34 \times 10^{+01}$	9.91×10^{-01}	3.59×10^{-01}	2.36	$1.71 \times 10^{+01}$
PARTICULATE MATTER < 2.5 µm	$1.29 \times 10^{+01}$	9.54×10^{-01}	3.46×10^{-01}	2.27	$1.65 \times 10^{+01}$
POLYCYCLIC AROMATIC HYDROCARBONS	2.05×10^{-01}	1.52×10^{-02}	5.51×10^{-03}	3.62×10^{-02}	2.62×10^{-01}
SULFUR DIOXIDE	5.23	3.87×10^{-01}	1.40×10^{-01}	9.22×10^{-01}	6.68
TETRACHLOROETHYLENE	3.07×10^{-02}	2.28×10^{-03}	8.24×10^{-04}	5.42×10^{-03}	3.93×10^{-02}
TOLUENE	4.23	3.13×10^{-01}	1.13×10^{-01}	7.45×10^{-01}	5.40
TOTAL SUSPENDED PARTICULATES	$1.41 \times 10^{+01}$	1.04	3.78×10^{-01}	2.48	$1.80 \times 10^{+01}$
TOTAL VOCS	$5.54 \times 10^{+01}$	4.10	1.49	9.77	$7.08 \times 10^{+01}$
TRICHLOROETHYLENE	1.89×10^{-02}	1.40×10^{-03}	5.06×10^{-04}	3.33×10^{-03}	2.41×10^{-02}

Table 3.64 presents total estimated annual emissions (for selected substances) from construction off-road vehicles and equipment by fuel type for the GMR.

Table 3.64: Total estimated annual emissions from construction off-road vehicles and equipment by fuel type

Substance	Emissions (tonnes/year)			
	2-Stroke & 4-Stroke Petrol	CNG & LPG	Diesel	Total
1,3 BUTADIENE	1.52×10^{-01}	7.69×10^{-05}	2.75×10^{-02}	1.79×10^{-01}
ACETALDEHYDE	1.01×10^{-01}	8.57×10^{-04}	3.71	3.81
BENZENE	1.47	1.31×10^{-05}	2.43×10^{-01}	1.72
CARBON MONOXIDE	$6.53 \times 10^{+02}$	$2.75 \times 10^{+01}$	$7.45 \times 10^{+01}$	$7.55 \times 10^{+02}$
FORMALDEHYDE	2.10×10^{-01}	2.48×10^{-03}	1.98	2.19
ISOMERS OF XYLENE	5.49	1.24×10^{-03}	2.80×10^{-01}	5.77
LEAD AND COMPOUNDS	9.05×10^{-04}	1.61×10^{-05}	1.45×10^{-03}	2.37×10^{-03}
OXIDES OF NITROGEN	$1.57 \times 10^{+01}$	6.85	$1.96 \times 10^{+02}$	$2.18 \times 10^{+02}$
PARTICULATE MATTER < 10 µm	2.56	3.22×10^{-02}	$1.45 \times 10^{+01}$	$1.71 \times 10^{+01}$
PARTICULATE MATTER < 2.5 µm	2.36	3.22×10^{-02}	$1.41 \times 10^{+01}$	$1.65 \times 10^{+01}$
POLYCYCLIC AROMATIC HYDROCARBONS	1.25×10^{-01}	-	1.37×10^{-01}	2.62×10^{-01}
SULFUR DIOXIDE	4.07×10^{-01}	7.43×10^{-03}	6.27	6.68
TETRACHLOROETHYLENE	3.93×10^{-02}	-	-	3.93×10^{-02}
TOLUENE	5.04	2.49×10^{-03}	3.53×10^{-01}	5.40
TOTAL SUSPENDED PARTICULATES	2.70	3.39×10^{-02}	$1.53 \times 10^{+01}$	$1.80 \times 10^{+01}$
TOTAL VOCS	$5.29 \times 10^{+01}$	1.39	$1.64 \times 10^{+01}$	$7.08 \times 10^{+01}$
TRICHLOROETHYLENE	2.41×10^{-02}	-	-	2.41×10^{-02}

Tables 3.65 and 3.66 present total estimated daily emissions (for selected substances) from construction off-road vehicles and equipment for the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions. These estimates are representative of typical January/July weekday and January/July weekend day daily emissions.

Table 3.65: Total estimated daily emissions from construction off-road vehicles and equipment in each region for typical January/July weekday

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	4.38×10^{-04}	3.24×10^{-05}	1.17×10^{-05}	7.72×10^{-05}	5.59×10^{-04}
ACETALDEHYDE	9.31×10^{-03}	6.90×10^{-04}	2.50×10^{-04}	1.64×10^{-03}	1.19×10^{-02}
BENZENE	4.19×10^{-03}	3.11×10^{-04}	1.12×10^{-04}	7.39×10^{-04}	5.35×10^{-03}
CARBON MONOXIDE	1.85	1.37×10^{-01}	4.95×10^{-02}	3.25×10^{-01}	2.36
FORMALDEHYDE	5.35×10^{-03}	3.97×10^{-04}	1.44×10^{-04}	9.44×10^{-04}	6.84×10^{-03}
ISOMERS OF XYLENE	1.41×10^{-02}	1.04×10^{-03}	3.78×10^{-04}	2.48×10^{-03}	1.80×10^{-02}
LEAD AND COMPOUNDS	5.79×10^{-06}	4.29×10^{-07}	1.55×10^{-07}	1.02×10^{-06}	7.40×10^{-06}
OXIDES OF NITROGEN	5.33×10^{-01}	3.95×10^{-02}	1.43×10^{-02}	9.40×10^{-02}	6.81×10^{-01}
PARTICULATE MATTER < 10 µm	4.18×10^{-02}	3.09×10^{-03}	1.12×10^{-03}	7.36×10^{-03}	5.33×10^{-02}
PARTICULATE MATTER < 2.5 µm	4.02×10^{-02}	2.98×10^{-03}	1.08×10^{-03}	7.08×10^{-03}	5.13×10^{-02}
POLYCYCLIC AROMATIC HYDROCARBONS	6.41×10^{-04}	4.75×10^{-05}	1.72×10^{-05}	1.13×10^{-04}	8.18×10^{-04}
SULFUR DIOXIDE	1.63×10^{-02}	1.21×10^{-03}	4.38×10^{-04}	2.88×10^{-03}	2.08×10^{-02}
TETRACHLOROETHYLENE	9.59×10^{-05}	7.10×10^{-06}	2.57×10^{-06}	1.69×10^{-05}	1.22×10^{-04}
TOLUENE	1.32×10^{-02}	9.77×10^{-04}	3.54×10^{-04}	2.32×10^{-03}	1.68×10^{-02}
TOTAL SUSPENDED PARTICULATES	4.40×10^{-02}	3.26×10^{-03}	1.18×10^{-03}	7.75×10^{-03}	5.61×10^{-02}
TOTAL VOCS	1.73×10^{-01}	1.28×10^{-02}	4.64×10^{-03}	3.05×10^{-02}	2.21×10^{-01}
TRICHLOROETHYLENE	5.89×10^{-05}	4.36×10^{-06}	1.58×10^{-06}	1.04×10^{-05}	7.52×10^{-05}

Table 3.66: Total estimated daily emissions from construction off-road vehicles and equipment in each region for typical January/July weekend day

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	2.51×10^{-04}	1.86×10^{-05}	6.72×10^{-06}	4.42×10^{-05}	3.20×10^{-04}
ACETALDEHYDE	5.33×10^{-03}	3.95×10^{-04}	1.43×10^{-04}	9.39×10^{-04}	6.80×10^{-03}
BENZENE	2.40×10^{-03}	1.78×10^{-04}	6.43×10^{-05}	4.23×10^{-04}	3.06×10^{-03}
CARBON MONOXIDE	1.06	7.82×10^{-02}	2.83×10^{-02}	1.86×10^{-01}	1.35
FORMALDEHYDE	3.06×10^{-03}	2.27×10^{-04}	8.22×10^{-05}	5.40×10^{-04}	3.91×10^{-03}
ISOMERS OF XYLENE	8.06×10^{-03}	5.97×10^{-04}	2.16×10^{-04}	1.42×10^{-03}	1.03×10^{-02}
LEAD AND COMPOUNDS	3.31×10^{-06}	2.46×10^{-07}	8.89×10^{-08}	5.84×10^{-07}	4.23×10^{-06}
OXIDES OF NITROGEN	3.05×10^{-01}	2.26×10^{-02}	8.19×10^{-03}	5.38×10^{-02}	3.90×10^{-01}
PARTICULATE MATTER < 10 µm	2.39×10^{-02}	1.77×10^{-03}	6.41×10^{-04}	4.21×10^{-03}	3.05×10^{-02}
PARTICULATE MATTER < 2.5 µm	2.30×10^{-02}	1.70×10^{-03}	6.17×10^{-04}	4.05×10^{-03}	2.94×10^{-02}
POLYCYCLIC AROMATIC HYDROCARBONS	3.67×10^{-04}	2.72×10^{-05}	9.83×10^{-06}	6.46×10^{-05}	4.68×10^{-04}
SULFUR DIOXIDE	9.34×10^{-03}	6.92×10^{-04}	2.50×10^{-04}	1.65×10^{-03}	1.19×10^{-02}
TETRACHLOROETHYLENE	5.49×10^{-05}	4.06×10^{-06}	1.47×10^{-06}	9.67×10^{-06}	7.01×10^{-05}
TOLUENE	7.55×10^{-03}	5.59×10^{-04}	2.02×10^{-04}	1.33×10^{-03}	9.64×10^{-03}
TOTAL SUSPENDED PARTICULATES	2.52×10^{-02}	1.86×10^{-03}	6.75×10^{-04}	4.43×10^{-03}	3.21×10^{-02}
TOTAL VOCS	9.89×10^{-02}	7.33×10^{-03}	2.65×10^{-03}	1.74×10^{-02}	1.26×10^{-01}
TRICHLOROETHYLENE	3.37×10^{-05}	2.50×10^{-06}	9.04×10^{-07}	5.94×10^{-06}	4.30×10^{-05}

3.5.8 Emission Projection Methodology

Emission projection factors for construction off-road vehicles and equipment use total primary energy consumption for other manufacturing and construction growth as the surrogate. Emission projection factors for construction off-road vehicles and equipment have been developed using the following data:

- Total primary energy consumption for other manufacturing and construction growth data (ABARE, 2005b).

Emission projection factors have been developed for every year from 2004 to 2031 (emissions for the base year 2003 are based on the activity data obtained coupled with the emission estimation techniques). Table 3.67 presents the emission projection factors for construction off-road vehicles and equipment.

Table 3.67: Emission projection factors for construction off-road vehicles and equipment

Year	Emission Projection Factors [1]	Year	Emission Projection Factors [1]
2004	1.0065	2018	1.1023
2005	1.0131	2019	1.1095
2006	1.0197	2020	1.1168
2007	1.0263	2021	1.1240
2008	1.0330	2022	1.1314
2009	1.0397	2023	1.1387
2010	1.0465	2024	1.1461
2011	1.0533	2025	1.1536
2012	1.0602	2026	1.1611
2013	1.0671	2027	1.1687
2014	1.0741	2028	1.1763
2015	1.0811	2029	1.1840
2016	1.0881	2030	1.1917
2017	1.0952	2031	1.1995

[1] Data Source: (ABARE, 2005b), http://www.abareconomics.com/data_services/excel/TPEC 05.xls?prodid=13183.

3.6 Industrial Off-Road Vehicles and Equipment

3.6.1 Emission Source Description

Emissions of combustion products and wheel generated dust emissions from industrial off-road vehicles and equipment arise from the use of unregistered 4-stroke petrol, compressed natural gas (CNG), diesel, electric, liquefied natural gas (LNG) and liquefied petroleum gas (LPG) engines on paved and unpaved roads for various industrial facilities. Industrial facilities include activities that are scheduled under the Protection of the Environment (Operations) Act 1997 and are therefore required to hold an Environment Protection License. The off-road mobile air emissions inventory includes the following types of industrial off-road vehicles and equipment:

- Aerial lifts;
- Bores and drill rigs;
- Bulldozers;
- Chippers;
- Cranes;
- Crushing and processing equipment;
- Excavators;
- Forklifts;
- Generators;
- Graders;
- Loaders;
- Off-highway trucks
- Other equipment;
- Pumps;
- Rollers;
- Rubber tyre loaders;
- Scrapers;
- Skid steer loaders;
- Sweepers and scrubbers;
- Tractors; and
- Tractors, loaders and backhoes.

Emissions from commercial and construction off-road vehicles and equipment have been separately estimated for the entire GMR and the results are presented in Sections 3.3 and 3.5 respectively.

3.6.2 Emission Estimation Methodology

- **Exhaust emissions**

Exhaust emissions from industrial off-road vehicles and equipment have been estimated using the NONROAD2005 Model (USEPA, 2005e), which requires vehicle and equipment type, fuel type, operating hours and area of operation data to be obtained from an industrial survey. Operating hours data for each vehicle/equipment and fuel type have been combined with time based emission factors to estimate emissions for each substance. The NONROAD2005 Model estimates exhaust emissions for each specific type of industrial off-road vehicle and equipment using the following input data estimates:

- Vehicle population for base year, distributed by age, power, fuel type, and application;
- Average load factor expressed as average fraction of available power;
- Available power in horsepower;
- Activity in hours of use per year; and
- Emission factor with deterioration and/or new standards.

Exhaust emissions from industrial off-road vehicles and equipment have been calculated using the following formula:

$$E_{i,j,k} = EF_{i,j,k} \times SF_{i,j,k} \times OT_{j,k} \times N_{j,k} \text{ x } LF_{j,k}$$

where:

$E_{i,j,k}$	=	Emission of substance i from fuel type j and industrial off-road vehicle/equipment type k	(kg/year)
$EF_{i,j,k}$	=	Time based emission factor of substance i for fuel type j and industrial off-road vehicle/equipment type k	(kg/hr)
$SF_{i,j,k}$	=	NO_x, VOC or PM speciation factor of substance i for fuel type j and industrial off-road vehicle/equipment type k	(%)
$OT_{j,k}$	=	Operating time for fuel type j and industrial off-road vehicle/equipment type k	(hr/year)
$N_{j,k}$	=	Number with fuel type j and industrial off-road vehicle/equipment type k	(Number)
$LF_{j,k}$	=	Load factor for fuel type j and industrial off-road vehicle/equipment type k	(%)

- **Wheel generated dust emissions**

Wheel generated dust emissions from industrial off-road vehicles have been estimated using the preferred method (Environment Australia, 1999b), which requires vehicle weight, vehicle kilometres travelled (VKT), proportion of VKT on paved and unpaved roads and area of operation data to be obtained from an industrial survey. Vehicle kilometres travelled and vehicle weight data for each road type have been combined with mass based emission factors to estimate emissions for each substance. Wheel generated dust emissions from industrial off-road vehicles on *paved roads* have been calculated using the following formula:

$$E_i = k_i \times (sL/2)^{0.65} \times (AW/3)^{1.5} \times SF_i \times VKT$$

where:

E_i	=	Emission of particle size i	(kg/year)
k_i	=	Empirical factor for particle size i	(Factor)
sL	=	Road surface silt loading	(g/m^2)
AW	=	Average vehicle weight	(Tonnes)
SF_i	=	PM speciation factor of particle size i	(%)
VKT	=	Vehicle kilometres travelled	(Kilometres)

Wheel generated dust emissions from industrial off-road vehicles on *unpaved roads* have been calculated using the following formula:

$$E_i = (k_i \times (sL/12)^{A_i} \times (AW/3)^{B_i} / (M/0.2)^{C_i}) \times SF_i \times VKT$$

where:

E_i	=	Emission of particle size i	(kg/year)
k_i	=	Empirical factor for particle size i	(Factor)
sL	=	Road surface silt loading	(g/m^2)
AW	=	Average vehicle weight	(Tonnes)
M	=	Road surface moisture content	(%)
SF_i	=	PM speciation factor of particle size i	(%)
VKT	=	Vehicle kilometres travelled	(Kilometres)
A_i	=	Empirical factor for particle size i	(Factor)
B_i	=	Empirical factor for particle size i	(Factor)
C_i	=	Empirical factor for particle size i	(Factor)

3.6.3 Activity Data

An industrial survey was conducted during 2004 and 2005 to obtain activity data for industrial off-road vehicles and equipment (DECC, 2007b). A total of 1090 facilities were mailed questionnaires on 17 November 2004. The industrial questionnaires were sent out under a NSW EPA notice to provide information and/or records under section 191 of the Protection of the Environment (Operations) Act 1997. Questionnaires were requested to be returned to the NSW EPA by 30 December 2004, after which follow up e-mails and phone calls were made to premises that had failed to return questionnaires. A further 71 facilities were identified and mailed questionnaires between 10 January 2005 and 14 February 2005. These were also issued under a section 191 notice and the same follow up process was used to ensure accurate and timely responses. In total, 1,161 industrial facilities were mailed a questionnaire, although emissions have only been provided for 571 industrial facilities. Emissions from 590 industrial facilities were not estimated as they either surrendered their licence, ceased operations, were subsequently found to be outside the GMR or had no off-road vehicles and equipment. All industrial facilities responded to the inventory questionnaire.

The purpose of the industrial survey was to obtain sufficient data so that emissions of combustion products and wheel generated dust emissions could be estimated from the use of unregistered 4-stroke petrol, compressed natural gas (CNG), diesel, electric, liquefied natural gas (LNG) and liquefied petroleum gas (LPG) engines on paved and unpaved roads for various industrial activities. The following activity data was collected through the industrial survey:

- Off-road vehicle/equipment operating location;
- Number and type of vehicle/equipment;
- Vehicle/equipment year and model;
- Engine size or power rating and fuel type;
- Fuel usage;
- Operating time, frequency and duration;
- Vehicle kilometres travelled (VKT); and
- Proportion of VKT on paved and unpaved roads.

A sample industrial survey questionnaire form used to collect activity data is presented in Appendix A.

Activity data required for estimating emissions from industrial off-road vehicles and equipment includes:

- Area of operation (DECC, 2007b);
- Population, engine power and fuel type (DECC, 2007b);
- Average load factor expressed as average fraction of available power (USEPA, 2004c);
- Activity in hours of use per year (DECC, 2007b);
- VKT and proportion of VKT on paved and unpaved roads (DECC, 2007b);
- Average vehicle weight (DECC, 2007b);
- Road surface silt loading (Environment Australia, 1999b); and
- Road surface moisture content (Environment Australia, 1999b).

Table 3.68 includes the type and number of industrial off-road vehicles and equipment in the GMR based on the 571 industrial facilities where activity data was obtained through the industrial survey.

Table 3.68: Industrial off-road vehicles and equipment – vehicle/equipment type and number during 2003 in the GMR

Vehicle/Equipment Type [1]	Number of Vehicles/Equipment [1]
Aerial lifts	21
Bores and drill rigs	39
Bulldozers	297
Chippers	3
Cranes	63
Crushing and processing equipment	21
Excavators	360
Forklifts	1,828
Generators	12
Graders	82
Loaders	384
Off-highway trucks	698
Other equipment	438
Pumps	1
Rollers	5
Rubber tyre loaders	339
Scrapers	37
Skid steer loaders	63
Sweepers & scrubbers	34
Tractors	108
Tractors, loaders & backhoes	35
Total Industrial Off-Road Vehicles and Equipment	4,868

[1] Data Source: (DECC, 2007b).

Table 3.69 includes the number of industrial off-road vehicles and equipment with a given fuel type in the GMR based on the 571 industrial facilities where activity data was obtained through the industrial survey.

Table 3.69: Industrial off-road vehicles and equipment – fuel type and number during 2003 in the GMR

Fuel Type [1]	Number of Vehicles/Equipment [1]
4-stroke petrol	147
CNG	155
Diesel	3,593
Diesel/Electric	4
Electric	96
LNG	1
LPG	872
Total Industrial Off-Road Vehicles and Equipment	4,868

[1] Data Source: (DECC, 2007b).

Table 3.70 includes the number of industrial off-road vehicles and equipment with a given engine power range in the GMR based on the 571 industrial facilities where activity data was obtained through the industrial survey.

Table 3.70: Industrial off-road vehicles and equipment – engine power range and number during 2003 in the GMR

Engine Power Range (kW) [1]	Number of 4-Stroke Petrol Vehicles/ Equipment [1]	Number of CNG Vehicles/ Equipment [1]	Number of Diesel Vehicles/ Equipment [1]	Number of Diesel/Electric Vehicles/ Equipment [1]	Number of Electric Vehicles/ Equipment [1]	Number of LNG Vehicles/ Equipment [1]	Number of LPG Vehicles/ Equipment [1]
< 50	132	121	452	-	93	1	682
50 to 99	7	31	763	-	-	-	172
100 to 149	7	3	456	-	-	-	11
150 to 199	-	-	414	-	-	-	7
200 to 299	1	-	563	-	-	-	-
300 to 500	-	-	365	-	-	-	-
> 500	-	-	580	4	3	-	-
Total Fuel Type	147	155	3,593	4	96	1	872
Total Vehicles and Equipment	4,868						

[1] Data Source: (DECC, 2007b).

Figure 3.13 shows the proportion of industrial off-road vehicles and equipment with a given fuel type and engine power range in the GMR based on the 571 industrial facilities where activity data was obtained through the industrial survey.

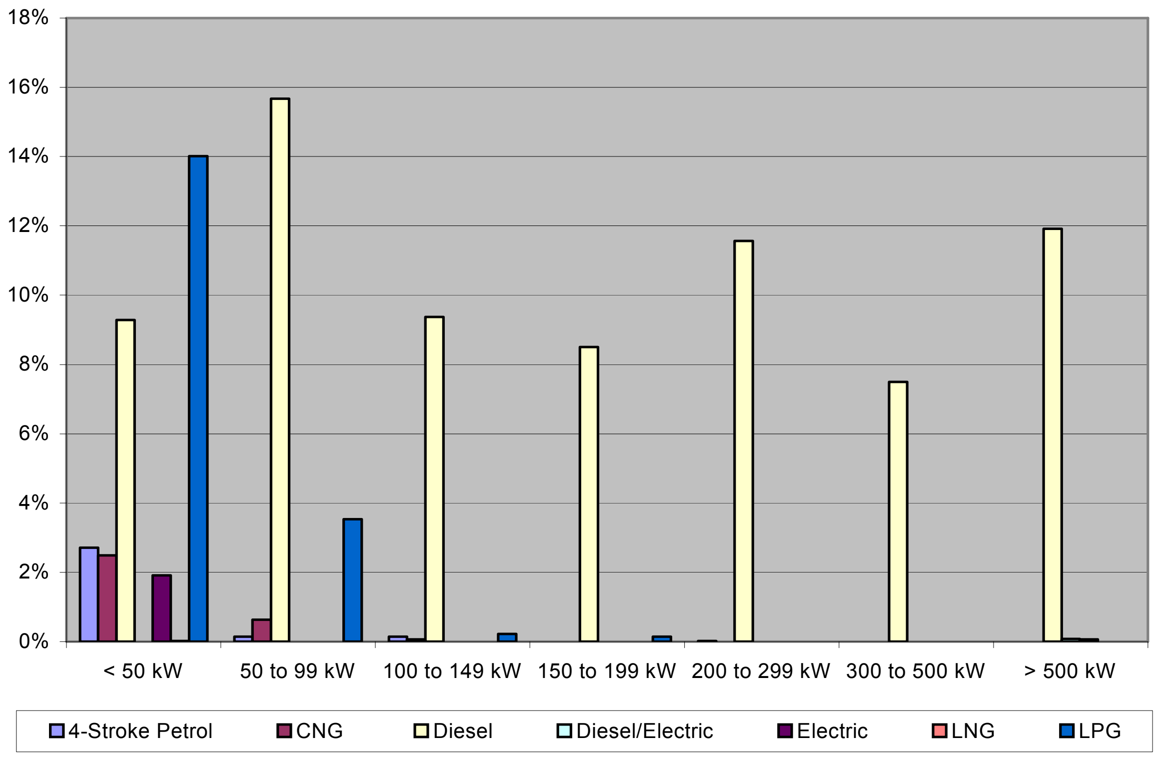

Figure 3.13: Proportion of fuel type and engine power range for industrial off-road vehicles and equipment during 2003 in the GMR

3.6.4 Emission and Speciation Factors

The emission and speciation factors for all substances from industrial off-road vehicles and equipment exhaust are detailed in Table 3.71.

Table 3.71: Emission and speciation factors for all substances from industrial off-road vehicles and equipment exhaust

Substance	Fuel Type		Emission Factor Source
CO, NO_x[1], PM_{10}, SO_2 & Total VOC	All		(USEPA, 2005e)
$PM_{2.5}$ & TSP	4-stroke petrol		(USEPA, 2004a & USEPA, 2004b) & (Norbeck et. al., 1998)
	Diesel		(USEPA, 2005e) & (Klimont et. al., 2002)
	CNG, LNG & LPG		(USEPA, 2004a & USEPA, 2004b) & (Norbeck et. al., 1998)
Organic air toxics	4-stroke petrol		Appendix D (ERG, 2003)
	Diesel		(Pechan, 2006) replacing Profile Number 1201 (USEPA, 2002)
	CNG, LNG & LPG		(Environment Australia, 2000)
Metal air toxics	All		(Environment Australia, 2000)
PAH	4-stroke petrol & Diesel	PM phase	Appendix D (ERG, 2003)
		VOC phase	(Khalili et. al., 1995)
	CNG, LNG & LPG		NA
PCDD/PCDF	4-stroke petrol & Diesel		Appendix D (ERG, 2003)
	CNG, LNG & LPG		NA
Speciated VOC & Methane	4-stroke petrol [2]		Profile Number 1203 (USEPA, 2002)
	Diesel		(Pechan, 2006) replacing Profile Number 1201 (USEPA, 2002)
	CNG, LNG & LPG		Profile Number 1001 (USEPA, 2002)

[1] The default NO_x speciation profile used in the inventory is 5 % NO_2 and 95% NO (USEPA, 2005a).
[2] Profile Number 0000 (USEPA, 2002) for “Unidentified” VOC.

The emission and speciation factors for all substances from industrial off-road vehicles wheel generated dust are detailed in Table 3.72.

Table 3.72: Emission and speciation factors for all substances from industrial off-road vehicles wheel generated dust

Substance	Emission Factor Source
PM_{10} & TSP	(Environment Australia, 1999b)
$PM_{2.5}$	(USEPA, 2003a) & (USEPA, 2003b)
Metal air toxics	(Environment Australia, 1999b)

3.6.5 Spatial Distribution of Emissions

Emissions from industrial off-road vehicles and equipment have been spatially distributed according to activity data obtained in the industrial survey (DECC, 2007b). Total emissions of each substance have been spatially distributed to each 1 km by 1 km grid cell according to the location of each industrial facility. Figure 3.14 shows the spatial distribution of industrial off-road vehicles and equipment in the GMR.

3.6.6 Temporal Variation of Emissions

Monthly, weekly and daily temporal emissions variation profiles for each industrial facility have been based on activity data obtained in the industrial survey (DECC, 2007b).

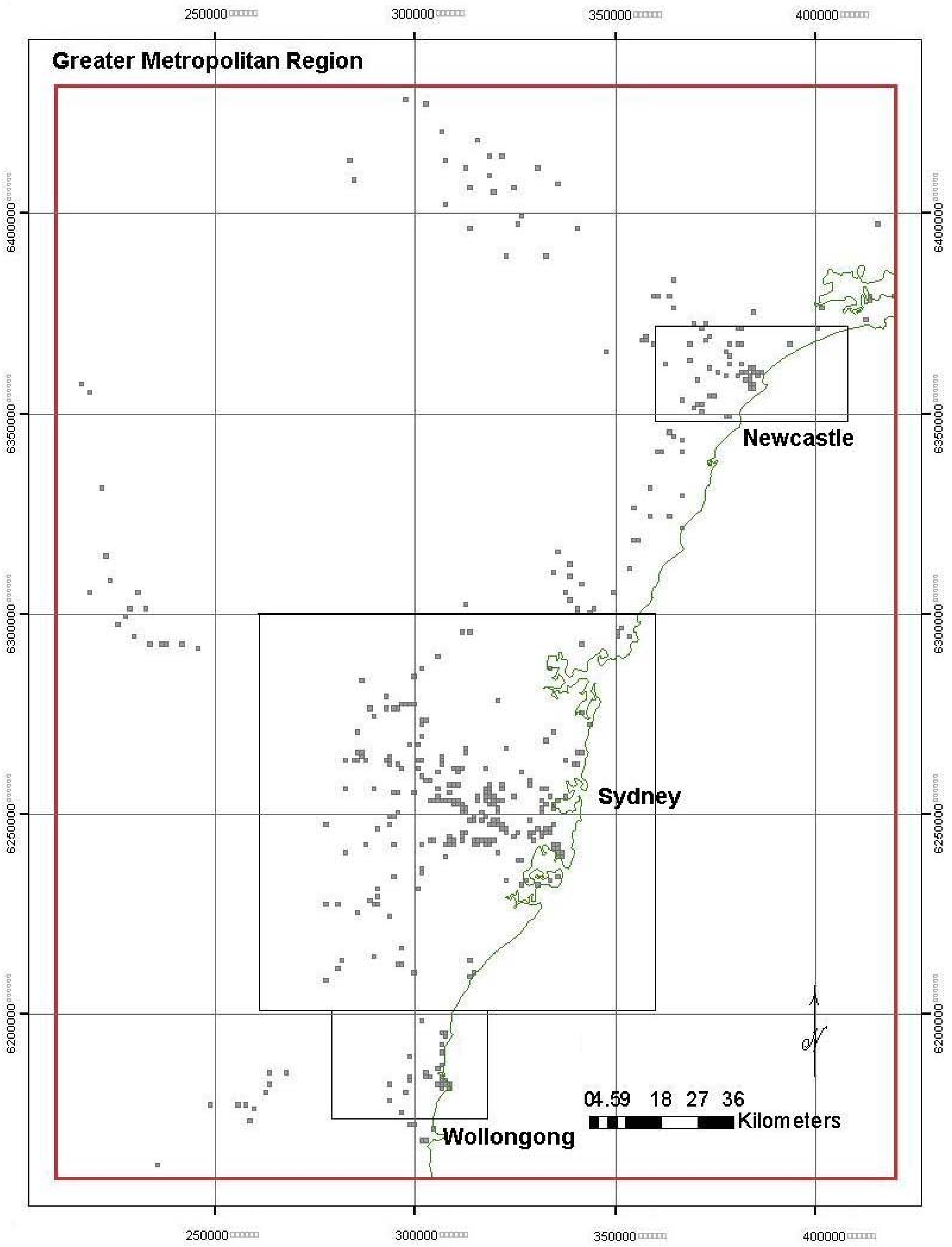

Figure 3.14: Spatial distribution of industrial off-road vehicles and equipment in the GMR

3.6.7 Emission Estimates

Table 3.73 presents total estimated annual emissions (for selected substances) from industrial off-road vehicles and equipment for the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions. Total estimated annual emissions of all substances from industrial off-road vehicles and equipment are presented in Appendix C.

Table 3.73: Total estimated annual emissions from industrial off-road vehicles and equipment in each region

Substance	Emissions (tonnes/year)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	1.68×10^{-01}	1.82×10^{-02}	2.72×10^{-02}	5.43×10^{-01}	7.57×10^{-01}
ACETALDEHYDE	$2.21 \times 10^{+01}$	2.39	3.59	$7.15 \times 10^{+01}$	$9.96 \times 10^{+01}$
BENZENE	1.46	1.58×10^{-01}	2.37×10^{-01}	4.73	6.59
CARBON MONOXIDE	$6.66 \times 10^{+02}$	$7.20 \times 10^{+01}$	$1.08 \times 10^{+02}$	$2.15 \times 10^{+03}$	$3.00 \times 10^{+03}$
FORMALDEHYDE	$1.18 \times 10^{+01}$	1.28	1.92	$3.83 \times 10^{+01}$	$5.34 \times 10^{+01}$
ISOMERS OF XYLENE	1.72	1.85×10^{-01}	2.78×10^{-01}	5.55	7.73
LEAD AND COMPOUNDS	$1.12 \times 10^{+01}$	1.21	1.81	$3.62 \times 10^{+01}$	$5.04 \times 10^{+01}$
OXIDES OF NITROGEN	$1.51 \times 10^{+03}$	$1.63 \times 10^{+02}$	$2.45 \times 10^{+02}$	$4.88 \times 10^{+03}$	$6.80 \times 10^{+03}$
PARTICULATE MATTER < 10 µm	$2.79 \times 10^{+03}$	$3.02 \times 10^{+02}$	$4.53 \times 10^{+02}$	$9.04 \times 10^{+03}$	$1.26 \times 10^{+04}$
PARTICULATE MATTER < 2.5 µm	$1.15 \times 10^{+03}$	$1.25 \times 10^{+02}$	$1.87 \times 10^{+02}$	$3.73 \times 10^{+03}$	$5.19 \times 10^{+03}$
POLYCYCLIC AROMATIC HYDROCARBONS	8.08×10^{-01}	8.74×10^{-02}	1.31×10^{-01}	2.61	3.64
SULFUR DIOXIDE	$4.32 \times 10^{+01}$	4.67	7.01	$1.40 \times 10^{+02}$	$1.95 \times 10^{+02}$
TETRACHLOROETHYLENE	2.02×10^{-04}	2.19×10^{-05}	3.28×10^{-05}	6.54×10^{-04}	9.11×10^{-04}
TOLUENE	2.18	2.35×10^{-01}	3.53×10^{-01}	7.04	9.80
TOTAL SUSPENDED PARTICULATES	$1.29 \times 10^{+04}$	$1.40 \times 10^{+03}$	$2.10 \times 10^{+03}$	$4.19 \times 10^{+04}$	$5.83 \times 10^{+04}$
TOTAL VOCS	$1.28 \times 10^{+02}$	$1.39 \times 10^{+01}$	$2.08 \times 10^{+01}$	$4.15 \times 10^{+02}$	$5.79 \times 10^{+02}$
TRICHLOROETHYLENE	1.24×10^{-04}	1.34×10^{-05}	2.01×10^{-05}	4.02×10^{-04}	5.59×10^{-04}

Table 3.74 presents total estimated annual emissions (for selected substances) from industrial off-road vehicles and equipment by fuel type for exhaust emissions and wheel generated dust emissions for the GMR.

Table 3.74: Total estimated annual emissions from industrial off-road vehicles and equipment by fuel type for exhaust emissions and wheel generated dust emissions

Substance	Emissions (tonnes/year)				
	4-Stroke Petrol	CNG, LNG & LPG	Diesel	Wheel Generated Dust	Total
1,3 BUTADIENE	1.12×10^{-02}	7.55×10^{-03}	7.38×10^{-01}	-	7.57×10^{-01}
ACETALDEHYDE	4.84×10^{-03}	8.41×10^{-02}	$9.95 \times 10^{+01}$	-	$9.96 \times 10^{+01}$
BENZENE	6.19×10^{-02}	1.29×10^{-03}	6.52	-	6.59
CARBON MONOXIDE	$2.95 \times 10^{+01}$	$7.81 \times 10^{+02}$	$2.19 \times 10^{+03}$	-	$3.00 \times 10^{+03}$
FORMALDEHYDE	2.02×10^{-02}	2.43×10^{-01}	$5.31 \times 10^{+01}$	-	$5.34 \times 10^{+01}$
ISOMERS OF XYLENE	8.00×10^{-02}	1.22×10^{-01}	7.52	-	7.73
LEAD AND COMPOUNDS	8.98×10^{-05}	4.76×10^{-04}	3.56×10^{-02}	$5.03 \times 10^{+01}$	$5.04 \times 10^{+01}$
OXIDES OF NITROGEN	1.42	$1.57 \times 10^{+02}$	$6.64 \times 10^{+03}$	-	$6.80 \times 10^{+03}$
PARTICULATE MATTER < 10 µm	1.34×10^{-02}	9.53×10^{-01}	$3.56 \times 10^{+02}$	$1.22 \times 10^{+04}$	$1.26 \times 10^{+04}$
PARTICULATE MATTER < 2.5 µm	1.23×10^{-02}	9.53×10^{-01}	$3.45 \times 10^{+02}$	$4.85 \times 10^{+03}$	$5.19 \times 10^{+03}$
POLYCYCLIC AROMATIC HYDROCARBONS	3.94×10^{-03}	-	3.64	-	3.64
SULFUR DIOXIDE	1.35×10^{-02}	6.79×10^{-01}	$1.94 \times 10^{+02}$	-	$1.95 \times 10^{+02}$
TETRACHLOROETHYLENE	9.11×10^{-04}	-	-	-	9.11×10^{-04}
TOLUENE	8.48×10^{-02}	2.44×10^{-01}	9.48	-	9.80
TOTAL SUSPENDED PARTICULATES	1.41×10^{-02}	1.00	$3.74 \times 10^{+02}$	$5.79 \times 10^{+04}$	$5.83 \times 10^{+04}$
TOTAL VOCS	1.18	$1.37 \times 10^{+02}$	$4.41 \times 10^{+02}$	-	$5.79 \times 10^{+02}$
TRICHLOROETHYLENE	5.59×10^{-04}	-	-	-	5.59×10^{-04}

Tables 3.75, 3.76, 3.77 and 3.78 present total estimated daily emissions (for selected substances) from industrial off-road vehicles and equipment for the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions. These estimates are representative of typical January weekday, January weekend day, July weekday and July weekend day daily emissions.

Table 3.75: Total estimated daily emissions from industrial off-road vehicles and equipment in each region for typical January weekday

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	3.66×10^{-04}	3.96×10^{-05}	5.94×10^{-05}	1.18×10^{-03}	1.65×10^{-03}
ACETALDEHYDE	4.82×10^{-02}	5.21×10^{-03}	7.82×10^{-03}	1.56×10^{-01}	2.17×10^{-01}
BENZENE	3.19×10^{-03}	3.45×10^{-04}	5.17×10^{-04}	1.03×10^{-02}	1.44×10^{-02}
CARBON MONOXIDE	1.45	1.57×10^{-01}	2.35×10^{-01}	4.69	6.54
FORMALDEHYDE	2.58×10^{-02}	2.79×10^{-03}	4.19×10^{-03}	8.35×10^{-02}	1.16×10^{-01}
ISOMERS OF XYLENE	3.74×10^{-03}	4.04×10^{-04}	6.06×10^{-04}	1.21×10^{-02}	1.68×10^{-02}
LEAD AND COMPOUNDS	2.44×10^{-02}	2.64×10^{-03}	3.95×10^{-03}	7.88×10^{-02}	1.10×10^{-01}
OXIDES OF NITROGEN	3.29	3.56×10^{-01}	5.34×10^{-01}	$1.06 \times 10^{+01}$	$1.48 \times 10^{+01}$
PARTICULATE MATTER < 10 µm	6.09	6.59×10^{-01}	9.88×10^{-01}	$1.97 \times 10^{+01}$	$2.74 \times 10^{+01}$
PARTICULATE MATTER < 2.5 µm	2.51	2.72×10^{-01}	4.07×10^{-01}	8.13	$1.13 \times 10^{+01}$
POLYCYCLIC AROMATIC HYDROCARBONS	1.76×10^{-03}	1.90×10^{-04}	2.86×10^{-04}	5.70×10^{-03}	7.94×10^{-03}
SULFUR DIOXIDE	9.43×10^{-02}	1.02×10^{-02}	1.53×10^{-02}	3.05×10^{-01}	4.25×10^{-01}
TETRACHLOROETHYLENE	4.41×10^{-07}	4.76×10^{-08}	7.15×10^{-08}	1.43×10^{-06}	1.99×10^{-06}
TOLUENE	4.75×10^{-03}	5.13×10^{-04}	7.70×10^{-04}	1.53×10^{-02}	2.14×10^{-02}
TOTAL SUSPENDED PARTICULATES	$2.82 \times 10^{+01}$	3.05	4.58	$9.13 \times 10^{+01}$	$1.27 \times 10^{+02}$
TOTAL VOCS	2.80×10^{-01}	3.03×10^{-02}	4.54×10^{-02}	9.06×10^{-01}	1.26
TRICHLOROETHYLENE	2.71×10^{-07}	2.93×10^{-08}	4.39×10^{-08}	8.76×10^{-07}	1.22×10^{-06}

Table 3.76: Total estimated daily emissions from industrial off-road vehicles and equipment in each region for typical January weekend day

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	2.79×10^{-04}	3.02×10^{-05}	4.53×10^{-05}	9.03×10^{-04}	1.26×10^{-03}
ACETALDEHYDE	3.68×10^{-02}	3.97×10^{-03}	5.96×10^{-03}	1.19×10^{-01}	1.66×10^{-01}
BENZENE	2.43×10^{-03}	2.63×10^{-04}	3.94×10^{-04}	7.86×10^{-03}	1.10×10^{-02}
CARBON MONOXIDE	1.11	1.20×10^{-01}	1.80×10^{-01}	3.58	4.99
FORMALDEHYDE	1.97×10^{-02}	2.13×10^{-03}	3.19×10^{-03}	6.37×10^{-02}	8.87×10^{-02}
ISOMERS OF XYLENE	2.85×10^{-03}	3.08×10^{-04}	4.62×10^{-04}	9.22×10^{-03}	1.28×10^{-02}
LEAD AND COMPOUNDS	1.86×10^{-02}	2.01×10^{-03}	3.01×10^{-03}	6.01×10^{-02}	8.37×10^{-02}
OXIDES OF NITROGEN	2.51	2.71×10^{-01}	4.07×10^{-01}	8.12	$1.13 \times 10^{+01}$
PARTICULATE MATTER < 10 µm	4.65	5.02×10^{-01}	7.53×10^{-01}	$1.50 \times 10^{+01}$	$2.09 \times 10^{+01}$
PARTICULATE MATTER < 2.5 µm	1.92	2.07×10^{-01}	3.11×10^{-01}	6.20	8.63
POLYCYCLIC AROMATIC HYDROCARBONS	1.34×10^{-03}	1.45×10^{-04}	2.18×10^{-04}	4.35×10^{-03}	6.05×10^{-03}
SULFUR DIOXIDE	7.19×10^{-02}	7.77×10^{-03}	1.17×10^{-02}	2.33×10^{-01}	3.24×10^{-01}
TETRACHLOROETHYLENE	3.36×10^{-07}	3.63×10^{-08}	5.45×10^{-08}	1.09×10^{-06}	1.51×10^{-06}
TOLUENE	3.62×10^{-03}	3.91×10^{-04}	5.87×10^{-04}	1.17×10^{-02}	1.63×10^{-02}
TOTAL SUSPENDED PARTICULATES	$2.15 \times 10^{+01}$	2.33	3.49	$6.96 \times 10^{+01}$	$9.70 \times 10^{+01}$
TOTAL VOCS	2.14×10^{-01}	2.31×10^{-02}	3.46×10^{-02}	6.91×10^{-01}	9.62×10^{-01}
TRICHLOROETHYLENE	2.06×10^{-07}	2.23×10^{-08}	3.35×10^{-08}	6.68×10^{-07}	9.30×10^{-07}

Table 3.77: Total estimated daily emissions from industrial off-road vehicles and equipment in each region for typical July weekday

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	4.95×10^{-04}	5.35×10^{-05}	8.03×10^{-05}	1.60×10^{-03}	2.23×10^{-03}
ACETALDEHYDE	6.52×10^{-02}	7.05×10^{-03}	1.06×10^{-02}	2.11×10^{-01}	2.94×10^{-01}
BENZENE	4.31×10^{-03}	4.66×10^{-04}	6.99×10^{-04}	1.39×10^{-02}	1.94×10^{-02}
CARBON MONOXIDE	1.96	2.12×10^{-01}	3.18×10^{-01}	6.35	8.84
FORMALDEHYDE	3.49×10^{-02}	3.77×10^{-03}	5.66×10^{-03}	1.13×10^{-01}	1.57×10^{-01}
ISOMERS OF XYLENE	5.06×10^{-03}	5.47×10^{-04}	8.20×10^{-04}	1.63×10^{-02}	2.28×10^{-02}
LEAD AND COMPOUNDS	3.30×10^{-02}	3.56×10^{-03}	5.34×10^{-03}	1.07×10^{-01}	1.48×10^{-01}
OXIDES OF NITROGEN	4.45	4.81×10^{-01}	7.22×10^{-01}	$1.44 \times 10^{+01}$	$2.00 \times 10^{+01}$
PARTICULATE MATTER < 10 µm	8.23	8.90×10^{-01}	1.34	$2.66 \times 10^{+01}$	$3.71 \times 10^{+01}$
PARTICULATE MATTER < 2.5 µm	3.40	3.67×10^{-01}	5.51×10^{-01}	$1.10 \times 10^{+01}$	$1.53 \times 10^{+01}$
POLYCYCLIC AROMATIC HYDROCARBONS	2.38×10^{-03}	2.58×10^{-04}	3.86×10^{-04}	7.70×10^{-03}	1.07×10^{-02}
SULFUR DIOXIDE	1.27×10^{-01}	1.38×10^{-02}	2.07×10^{-02}	4.12×10^{-01}	5.74×10^{-01}
TETRACHLOROETHYLENE	5.96×10^{-07}	6.44×10^{-08}	9.66×10^{-08}	1.93×10^{-06}	2.68×10^{-06}
TOLUENE	6.42×10^{-03}	6.94×10^{-04}	1.04×10^{-03}	2.07×10^{-02}	2.89×10^{-02}
TOTAL SUSPENDED PARTICULATES	$3.82 \times 10^{+01}$	4.12	6.19	$1.23 \times 10^{+02}$	$1.72 \times 10^{+02}$
TOTAL VOCS	3.79×10^{-01}	4.09×10^{-02}	6.14×10^{-02}	1.22	1.71
TRICHLOROETHYLENE	3.66×10^{-07}	3.96×10^{-08}	5.94×10^{-08}	1.18×10^{-06}	1.65×10^{-06}

Table 3.78: Total estimated daily emissions from industrial off-road vehicles and equipment in each region for typical July weekend day

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	3.78×10^{-04}	4.08×10^{-05}	6.12×10^{-05}	1.22×10^{-03}	1.70×10^{-03}
ACETALDEHYDE	4.97×10^{-02}	5.37×10^{-03}	8.06×10^{-03}	1.61×10^{-01}	2.24×10^{-01}
BENZENE	3.29×10^{-03}	3.55×10^{-04}	5.33×10^{-04}	1.06×10^{-02}	1.48×10^{-02}
CARBON MONOXIDE	1.50	1.62×10^{-01}	2.43×10^{-01}	4.84	6.74
FORMALDEHYDE	2.66×10^{-02}	2.88×10^{-03}	4.32×10^{-03}	8.61×10^{-02}	1.20×10^{-01}
ISOMERS OF XYLENE	3.86×10^{-03}	4.17×10^{-04}	6.25×10^{-04}	1.25×10^{-02}	1.74×10^{-02}
LEAD AND COMPOUNDS	2.51×10^{-02}	2.72×10^{-03}	4.08×10^{-03}	8.13×10^{-02}	1.13×10^{-01}
OXIDES OF NITROGEN	3.39	3.67×10^{-01}	5.50×10^{-01}	$1.10 \times 10^{+01}$	$1.53 \times 10^{+01}$
PARTICULATE MATTER < 10 µm	6.28	6.79×10^{-01}	1.02	$2.03 \times 10^{+01}$	$2.83 \times 10^{+01}$
PARTICULATE MATTER < 2.5 µm	2.59	2.80×10^{-01}	4.20×10^{-01}	8.38	$1.17 \times 10^{+01}$
POLYCYCLIC AROMATIC HYDROCARBONS	1.82×10^{-03}	1.96×10^{-04}	2.95×10^{-04}	5.88×10^{-03}	8.18×10^{-03}
SULFUR DIOXIDE	9.72×10^{-02}	1.05×10^{-02}	1.58×10^{-02}	3.14×10^{-01}	4.38×10^{-01}
TETRACHLOROETHYLENE	4.54×10^{-07}	4.91×10^{-08}	7.37×10^{-08}	1.47×10^{-06}	2.05×10^{-06}
TOLUENE	4.89×10^{-03}	5.29×10^{-04}	7.93×10^{-04}	1.58×10^{-02}	2.20×10^{-02}
TOTAL SUSPENDED PARTICULATES	$2.91 \times 10^{+01}$	3.15	4.72	$9.41 \times 10^{+01}$	$1.31 \times 10^{+02}$
TOTAL VOCS	2.89×10^{-01}	3.12×10^{-02}	4.68×10^{-02}	9.34×10^{-01}	1.30
TRICHLOROETHYLENE	2.79×10^{-07}	3.02×10^{-08}	4.53×10^{-08}	9.03×10^{-07}	1.26×10^{-06}

3.6.8 Emissions Projection Methodology

Emission projection factors for industrial off-road vehicles and equipment use total primary energy consumption (minus transport and residential) growth as the surrogate. Emission projection factors for industrial off-road vehicles and equipment have been developed using the following data:

- Total primary energy consumption (minus transport and residential) growth data (ABARE, 2005b).

Emission projection factors have been developed for every year from 2004 to 2031 (emissions for the base year 2003 are based on the activity data obtained coupled with the emission estimation techniques). Table 3.42, Section 3.3.8 presents the emission projection factors for industrial off-road vehicles and equipment.

3.7 Loading and Unloading Petroleum Products

3.7.1 Emission Source Description

Emissions of volatile organic compounds from loading and unloading of petroleum products occur when fugitive vapours are displaced during the transfer of fuels to and from tankers at marine terminals. Ballasting of tankers, that is, the practice of filling cargo tank compartments with seawater after the petroleum products are unloaded, is not common practice in the GMR (Caltex, 2006 & Shell 2006), so emissions from this activity have not been considered in the off-road mobile air emissions inventory. Emission sources from loading and unloading of petroleum products at marine terminals included in the off-road mobile air emissions inventory are as follows:

- **Marine terminal locations:**
  - Port Botany, Gore Bay, Kurnell and Port Kembla.
- **Petroleum products:**
  - Crude oil, diesel, Avtur, kerosene and petrol.

Emissions from loading petroleum products at Gore Bay and Kurnell marine terminals have been separately estimated for the entire GMR and the results are presented in the industrial air emissions inventory (DECC, 2007b).

3.7.2 Emission Estimation Methodology

Emissions from loading and unloading petroleum products have been estimated using the preferred method (Environment Australia, 1999a), which requires the mass or volume of petroleum products loaded and unloaded data to be obtained from operators or port authorities. The volume of each petroleum product loaded and unloaded has been combined with volume based emission factors to estimate emissions for each substance.

Emissions from loading and unloading petroleum products have been calculated using the following formula:

$$E_{i,j} = EF_{i,j} \times SF_{i,j} \times F_j$$

where:

$E_{i,j}$	=	Emission of substance i from petroleum product type j	(kg/year)
$EF_{i,j}$	=	Volume based emission factor of substance i for petroleum product type j	(kg/litres petroleum product)
$SF_{i,j}$	=	VOC speciation factor of substance i for petroleum product type j	(%)
F_j	=	Quantity of petroleum product type j loaded or unloaded	(litres/year)

3.7.3 Activity Data

Activity data required for estimating emissions from loading and unloading petroleum products includes shipping logs, mass or volume of petroleum products loaded and unloaded and density of petroleum products.

Shipping logs for commercial ships during 2003 have been obtained from the following port authorities:

- Sydney Ports Corporation – Port Botany, Gore Bay and Kurnell (SPC, 2004 & SPC, 2005); and
- Port Kembla Port Corporation – Port Kembla (PKPC, 2005).

The shipping logs supplied by port authorities include the following information:

- *Ship data* - Name of ship, dead weight tonnage (DWT), overall length and ship type;
- *Anchorage data* - The date and time when each ship arrives and anchors off the coast;
- *Port arrival and departure data* – The date and time when each ship arrives and departs from port; and
- *Berth arrival and departure data* – The date and time each ship arrives and departs from berth.

Mass or volume of petroleum products loaded and unloaded have been obtained from the following sources:

- Port Botany – loaded (SPC, 2004) and unloaded (DECC, 2007b). The quantity of petrol and diesel loaded has been calculated from the ratio of diesel to petrol exports (ABARE, 2005d);
- Gore Bay – unloaded (DECC, 2007b);
- Kurnell – unloaded (Caltex, 2006); and
- Port Kembla – unloaded (PKPC, 2004). The quantity of petrol and diesel unloaded has been calculated from the ratio of diesel to petrol imports (ABARE, 2005d).

Tables 3.79 and 3.80 present the mass of petroleum products loaded and unloaded at each marine terminal and the density of petroleum products respectively.

Table 3.79: Loading and unloading petroleum products – mass of petroleum products loaded and unloaded at each marine terminal during 2003 in the GMR

Petroleum Product Loaded (tonnes/year) [1]						
Marine Terminal	**Crude Oil**	**Diesel**	**Avtur**	**Kerosene**	**Petrol**	**Data Source**
Port Botany	-	9,014	-	-	11,719	(SPC, 2004)
Total Fuel Loaded	-	9,014	-	-	11,719	As Above
Petroleum Product Unloaded (tonnes/year)						
Marine Terminal	**Crude Oil**	**Diesel**	**Avtur**	**Kerosene**	**Petrol**	**Data Source**
Port Botany	-	51,882	-	-	197,165	(DECC, 2007b)
Gore Bay	3,132,663	38,578	27,925	41,478	320,148	(DECC, 2007b)
Kurnell	5,301,000	178,904	600,625	-	109,372	(Caltex, 2006)
Port Kembla	15,342	12,202	-	-	10,005	(PKPC, 2004)
Total Fuel Unloaded	8,449,005	281,566	628,550	41,478	636,691	As Above

[1] Emissions from loading petroleum products at Gore Bay and Kurnell marine terminals have been separately estimated for the entire GMR and the results are presented in the industrial air emissions inventory (DECC, 2007b).

Table 3.80: Loading and unloading petroleum products – density of petroleum products

Petroleum Product	Crude Oil	Diesel	Avtur	Kerosene	Petrol
Density of Petroleum Products (kg/litres)	0.9	0.836	0.775	0.81	0.739
Data Source	(DEH, 2004)	(DEH, 2004)	(ATSDR ,1998)	(ABARE, 2005c)	(DEH, 2004)

3.7.4 Emission and Speciation Factors

The emission and speciation factors for all substances from loading and unloading of petroleum products are detailed in Table 3.81.

Table 3.81: Emission and speciation factors for all substances from loading and unloading of petroleum products

Substance	Petroleum Product	Emission Factor Source
Total VOC	Crude Oil	(USEPA, 1995b)
	Diesel	(USEPA, 1995b)
	Avtur	(USEPA, 1995b)
	Kerosene	(USEPA, 1995b)
	Petrol	(USEPA, 1995b)
Speciated VOC & Methane	Crude Oil	Profile Number 0305 (USEPA, 2002)
	Diesel	(BP, 2001b)
	Avtur	Profile Number 0100 (USEPA, 2002)
	Kerosene	(ATSDR, 1998)
	Petrol	(BP, 2001a)

3.7.5 Spatial Distribution of Emissions

Emissions from loading and unloading of petroleum products have been spatially distributed according to activity data obtained in the industrial survey (DECC, 2007b). Total emissions of each substance have been spatially distributed to each 1 km by 1 km grid cell according to the location of each marine terminal. Figure 3.15 shows the spatial distribution of loading and unloading of petroleum products in the GMR.

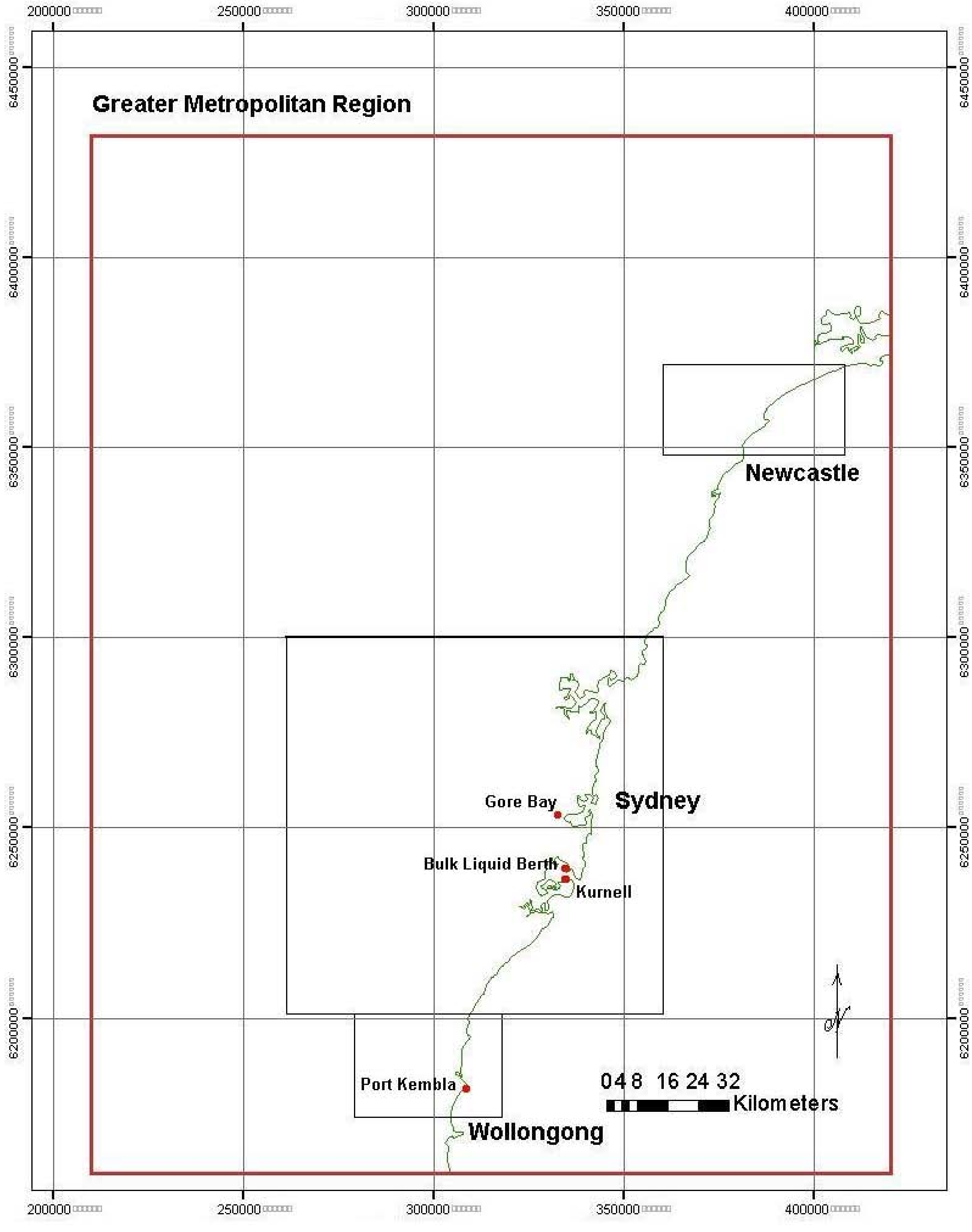

Figure 3.15: Spatial distribution of loading and unloading petroleum products in the GMR

3.7.6 Temporal Variation of Emissions

The following temporal emissions variation profiles have been used for loading and unloading of petroleum products:

- Monthly - assumed to vary for each month of the year (SPC, 2004; SPC, 2005; NPC, 2005; & PKPC, 2005);
- Weekly (i.e. Weekday and Weekend day) - assumed to be ~2.47 times higher on weekdays compared with weekend days (SPC, 2004; SPC, 2005; NPC, 2005; & PKPC, 2005); and
- Daily – assumed to vary for each hour of the day (SPC, 2004; SPC, 2005; NPC, 2005; & PKPC, 2005).

Tables 3.82, 3.83 and 3.84 detail the temporal emissions variation profiles that have been used for loading and unloading petroleum products.

Table 3.82: Monthly temporal emissions variation profile for loading and unloading of petroleum products

Month	Monthly Temporal Factor		Month	Monthly Temporal Factor	
January	1.00	6.48%	July	1.25	8.10%
February	1.29	8.33%	August	1.50	9.72%
March	1.07	6.94%	September	1.25	8.10%
April	1.14	7.41%	October	1.50	9.72%
May	1.43	9.26%	November	1.18	7.64%
June	1.29	8.33%	December	1.54	9.95%

Table 3.83: Weekly temporal emissions variation profile for loading and unloading of petroleum products

Day Type	Weekly Temporal Factor		Day Type	Weekly Temporal Factor	
Weekday	5.00	86.08%	Weekend day	0.81	13.92%

Table 3.84: Daily temporal emissions variation profile for loading and unloading of petroleum products

Hour	Weekday Temporal Factor		Weekend day Temporal Factor		Hour	Weekday Temporal Factor		Weekend day Temporal Factor	
1 am	0.30	1.39%	0.30	1.39%	1 pm	1.35	6.25%	1.35	6.25%
2 am	0.40	1.85%	0.40	1.85%	2 pm	1.15	5.32%	1.15	5.32%
3 am	0.50	2.31%	0.50	2.31%	3 pm	1.35	6.25%	1.35	6.25%
4 am	0.10	0.46%	0.10	0.46%	4 pm	1.55	7.18%	1.55	7.18%
5 am	0.45	2.08%	0.45	2.08%	5 pm	1.20	5.56%	1.20	5.56%
6 am	0.70	3.24%	0.70	3.24%	6 pm	0.55	2.55%	0.55	2.55%
7 am	1.50	6.94%	1.50	6.94%	7 pm	0.40	1.85%	0.40	1.85%
8 am	1.50	6.94%	1.50	6.94%	8 pm	0.75	3.47%	0.75	3.47%
9 am	2.20	10.19%	2.20	10.19%	9 pm	0.50	2.31%	0.50	2.31%
10 am	1.85	8.56%	1.85	8.56%	10 pm	0.45	2.08%	0.45	2.08%
11 am	1.25	5.79%	1.25	5.79%	11 pm	0.15	0.69%	0.15	0.69%
12 noon	1.35	6.25%	1.35	6.25%	12 midnight	0.10	0.46%	0.10	0.46%

3.7.7 Emission Estimates

Table 3.85 presents total estimated annual emissions (for selected substances) from loading and unloading of petroleum products for the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions. Total estimated annual emissions of all substances from loading and unloading of petroleum products are presented in Appendix C.

Table 3.85: Total estimated annual emissions from loading and unloading of petroleum products in each region

Substance	Emissions (tonnes/year)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	-	-	-	-	-
ACETALDEHYDE	-	-	-	-	-
BENZENE	3.07	-	5.15×10^{-02}	-	3.12
CARBON MONOXIDE	-	-	-	-	-
FORMALDEHYDE	-	-	-	-	-
ISOMERS OF XYLENE	2.45	-	3.70×10^{-02}	-	2.49
LEAD AND COMPOUNDS	-	-	-	-	-
OXIDES OF NITROGEN	-	-	-	-	-
PARTICULATE MATTER < 10 µm	-	-	-	-	-
PARTICULATE MATTER < 2.5 µm	-	-	-	-	-
POLYCYCLIC AROMATIC HYDROCARBONS	-	-	-	-	-
SULFUR DIOXIDE	-	-	-	-	-
TETRACHLOROETHYLENE	-	-	-	-	-
TOLUENE	7.47	-	1.24×10^{-01}	-	7.60
TOTAL SUSPENDED PARTICULATES	-	-	-	-	-
TOTAL VOCS	$1.12 \times 10^{+03}$	-	7.71	-	$1.13 \times 10^{+03}$
TRICHLOROETHYLENE	-	-	-	-	-

Tables 3.86, 3.87, 3.88 and 3.89 present total estimated daily emissions (for selected substances) from loading and unloading of petroleum products for the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions. These estimates are representative of typical January weekday, January weekend day, July weekday and July weekend day daily emissions.

Table 3.86: Total estimated daily emissions from loading and unloading of petroleum products in each region for typical January weekday

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	-	-	-	-	-
ACETALDEHYDE	-	-	-	-	-
BENZENE	7.44×10^{-03}	-	1.25×10^{-04}	-	7.57×10^{-03}
CARBON MONOXIDE	-	-	-	-	-
FORMALDEHYDE	-	-	-	-	-
ISOMERS OF XYLENE	5.94×10^{-03}	-	8.98×10^{-05}	-	6.03×10^{-03}
LEAD AND COMPOUNDS	-	-	-	-	-
OXIDES OF NITROGEN	-	-	-	-	-
PARTICULATE MATTER < 10 µm	-	-	-	-	-
PARTICULATE MATTER < 2.5 µm	-	-	-	-	-
POLYCYCLIC AROMATIC HYDROCARBONS	-	-	-	-	-
SULFUR DIOXIDE	-	-	-	-	-
TETRACHLOROETHYLENE	-	-	-	-	-
TOLUENE	1.81×10^{-02}	-	3.01×10^{-04}	-	1.84×10^{-02}
TOTAL SUSPENDED PARTICULATES	-	-	-	-	-
TOTAL VOCS	2.72	-	1.87×10^{-02}	-	2.74
TRICHLOROETHYLENE	-	-	-	-	-

Table 3.87: Total estimated daily emissions from loading and unloading of petroleum products in each region for typical January weekend day

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	-	-	-	-	-
ACETALDEHYDE	-	-	-	-	-
BENZENE	3.46×10^{-03}	-	5.80×10^{-05}	-	3.52×10^{-03}
CARBON MONOXIDE	-	-	-	-	-
FORMALDEHYDE	-	-	-	-	-
ISOMERS OF XYLENE	2.76×10^{-03}	-	4.17×10^{-05}	-	2.80×10^{-03}
LEAD AND COMPOUNDS	-	-	-	-	-
OXIDES OF NITROGEN	-	-	-	-	-
PARTICULATE MATTER < 10 µm	-	-	-	-	-
PARTICULATE MATTER < 2.5 µm	-	-	-	-	-
POLYCYCLIC AROMATIC HYDROCARBONS	-	-	-	-	-
SULFUR DIOXIDE	-	-	-	-	-
TETRACHLOROETHYLENE	-	-	-	-	-
TOLUENE	8.42×10^{-03}	-	1.40×10^{-04}	-	8.56×10^{-03}
TOTAL SUSPENDED PARTICULATES	-	-	-	-	-
TOTAL VOCS	1.26	-	8.70×10^{-03}	-	1.27
TRICHLOROETHYLENE	-	-	-	-	-

Table 3.88: Total estimated daily emissions from loading and unloading of petroleum products in each region for typical July weekday

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	-	-	-	-	-
ACETALDEHYDE	-	-	-	-	-
BENZENE	9.31×10^{-03}	-	1.56×10^{-04}	-	9.46×10^{-03}
CARBON MONOXIDE	-	-	-	-	-
FORMALDEHYDE	-	-	-	-	-
ISOMERS OF XYLENE	7.42×10^{-03}	-	1.12×10^{-04}	-	7.54×10^{-03}
LEAD AND COMPOUNDS	-	-	-	-	-
OXIDES OF NITROGEN	-	-	-	-	-
PARTICULATE MATTER < 10 µm	-	-	-	-	-
PARTICULATE MATTER < 2.5 µm	-	-	-	-	-
POLYCYCLIC AROMATIC HYDROCARBONS	-	-	-	-	-
SULFUR DIOXIDE	-	-	-	-	-
TETRACHLOROETHYLENE	-	-	-	-	-
TOLUENE	2.27×10^{-02}	-	3.76×10^{-04}	-	2.30×10^{-02}
TOTAL SUSPENDED PARTICULATES	-	-	-	-	-
TOTAL VOCS	3.40	-	2.34×10^{-02}	-	3.42
TRICHLOROETHYLENE	-	-	-	-	-

Table 3.89: Total estimated daily emissions from loading and unloading of petroleum products in each region for typical July weekend day

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	-	-	-	-	-
ACETALDEHYDE	-	-	-	-	-
BENZENE	4.32×10^{-03}	-	7.25×10^{-05}	-	4.40×10^{-03}
CARBON MONOXIDE	-	-	-	-	-
FORMALDEHYDE	-	-	-	-	-
ISOMERS OF XYLENE	3.45×10^{-03}	-	5.21×10^{-05}	-	3.50×10^{-03}
LEAD AND COMPOUNDS	-	-	-	-	-
OXIDES OF NITROGEN	-	-	-	-	-
PARTICULATE MATTER < 10 µm	-	-	-	-	-
PARTICULATE MATTER < 2.5 µm	-	-	-	-	-
POLYCYCLIC AROMATIC HYDROCARBONS	-	-	-	-	-
SULFUR DIOXIDE	-	-	-	-	-
TETRACHLOROETHYLENE	-	-	-	-	-
TOLUENE	1.05×10^{-02}	-	1.75×10^{-04}	-	1.07×10^{-02}
TOTAL SUSPENDED PARTICULATES	-	-	-	-	-
TOTAL VOCS	1.58	-	1.09×10^{-02}	-	1.59
TRICHLOROETHYLENE	-	-	-	-	-

3.7.8 Emission Projection Methodology

Emission projection factors for loading and unloading of petroleum products use total oil consumption growth as the surrogate. Emission projection factors for loading and unloading of petroleum products have been developed using the following data:

- Total oil consumption growth data (ABARE, 2005b).

Emission projection factors have been developed for every year from 2004 to 2031 (emissions for the base year 2003 are based on the activity data obtained coupled with the emission estimation techniques). Table 3.90 presents the emission projection factors for loading and unloading of petroleum products.

Table 3.90: Emission projection factors for loading and unloading of petroleum products

Year	Emission Projection Factors [1]	Year	Emission Projection Factors [1]
2004	1.0163	2018	1.2741
2005	1.0328	2019	1.2948
2006	1.0496	2020	1.3159
2007	1.0667	2021	1.3373
2008	1.0841	2022	1.3591
2009	1.1017	2023	1.3812
2010	1.1197	2024	1.4037
2011	1.1379	2025	1.4265
2012	1.1564	2026	1.4497
2013	1.1752	2027	1.4733
2014	1.1944	2028	1.4973
2015	1.2138	2029	1.5217
2016	1.2336	2030	1.5465
2017	1.2536	2031	1.5716

[1] Data Source: (ABARE, 2005b), http://www.abareconomics.com/data_services/excel/TPEC 05.xls?prodid=13183.

3.8 Railways

3.8.1 Emission Source Description

Emissions of combustion products from railways arise from the use of coal (i.e. steam), diesel and electric locomotives on the rail network.

The off-road mobile air emissions inventory includes diesel locomotives only. Emissions from electric locomotives have not been included, since emissions from electricity generation have been separately estimated as part of the industrial air emissions inventory (DECC, 2007b). Also, emissions from steam locomotives have not been included since their use is limited primarily for tourist attractions so they are considered to be a minor source of air emissions.

3.8.2 Emission Estimation Methodology

Emissions from railways have been estimated using the preferred method (Environment Australia, 1999c), which requires the volume of fuel consumed and the gross tonnes kilometres (GTK) to be obtained from Australian Bureau of Agriculture and Resource Economics (ABARE) and rail operators. Since rail fuel consumption data from ABARE is for NSW, the rail fuel consumption in the GMR has been estimated to be in the same proportion as GTK in the GMR compared with NSW. The volume of fuel consumed has been combined with volume based emission factors to estimate emissions for each substance.

Emissions from railways have been calculated using the following formula:

$$E_i = EF_i \times SF_i \times F$$

where:

E_i	=	Emission of substance i	(kg/year)
EF_i	=	Volume based emission factor for substance i	(kg/litres fuel)
SF_i	=	NO_x, VOC or PM speciation factor for substance i	(%)
F	=	Quantity of fuel consumed	(litres/year)

3.8.3 Activity Data

Activity data required for estimating emissions from railways includes:

- Rail network in the GMR (Pacific National, 2005);
- Volume of automotive diesel oil (ADO) consumed in NSW (ABARE, 2005a); and
- Gross tonnes kilometres (GTK) in the GMR and NSW (Pacific National, 2005).

Tables 3.91 and 3.92 present the volume of ADO consumed and GTK in the GMR and NSW respectively.

Table 3.91: Railways – volume of ADO consumed during 2003 in the GMR and NSW

Volume of ADO Consumed (litres)	Region	Data Source
140,000,000 [1]	NSW	(ABARE, 2005a)
56,689,506 [2]	GMR	(ABARE, 2005a) & (Pacific National, 2005)

[1] Assuming volume of ADO consumed by railway transport in NSW and ACT during 2003-04 is 5.39 peta joules (ABARE, 2005a) and energy content of ADO is 38.6 mega joules/litres (ABARE, 2005c).
[2] Assuming that ADO consumed in the GMR is proportional to GTK. Approximately 40% of NSW and ACT GTK is in the GMR (Pacific National, 2005).

Table 3.92: Railways – GTK during 2003 in the GMR and NSW

GTK by Region [1]		
Illawarra	**Newcastle Metropolitan**	**Outer Newcastle**
526,360,904	457,050,338	917,099,967
Sydney Metropolitan	**Sydney North**	**Sydney South**
4,016,813,162	700,473,201	1,099,837,443
Sydney West	**GMR**	**NSW**
1,194,319,280	8,911,954,297	22,008,898,989

[1] Data Source: (Pacific National, 2005).

3.8.4 Emission and Speciation Factors

The emission and speciation factors for all substances from railways are detailed in Table 3.93.

Table 3.93: Emission and speciation factors for all substances from railways

Substance	Fuel Type		Emission Factor Source
CO, NO_x[1], PM_{10}, SO_2 & Total VOC	Diesel		(Environment Australia, 1999c)
$PM_{2.5}$ & TSP	Diesel		Appendix C (ERG, 2003) & (Klimont et. al., 2002)
Organic air toxics	Diesel		(Environment Australia, 1999c) & Appendix C (ERG, 2003)
Metal air toxics	Diesel		(Environment Australia, 1999c) & Appendix C (ERG, 2003)
PAH	Diesel	PM phase	Appendix C (ERG, 2003)
		VOC phase	(Khalili et. al., 1995)
PCDD/PCDF	Diesel		Appendix D (ERG, 2003)
Speciated VOC & Methane	Diesel		Profile Number 0008 (USEPA, 2002)

[1] The default NO_x speciation profile used in the inventory is 5 % NO_2 and 95% NO (USEPA, 2005a).

3.8.5 Spatial Distribution of Emissions

Emissions from railways have been spatially distributed according to activity data obtained from rail operators (Pacific National, 2005). Total emissions of each substance have been spatially distributed to each 1 km by 1 km grid cell according to the relative traffic intensity within the rail network. Figure 3.16 shows the spatial distribution of railways in the GMR.

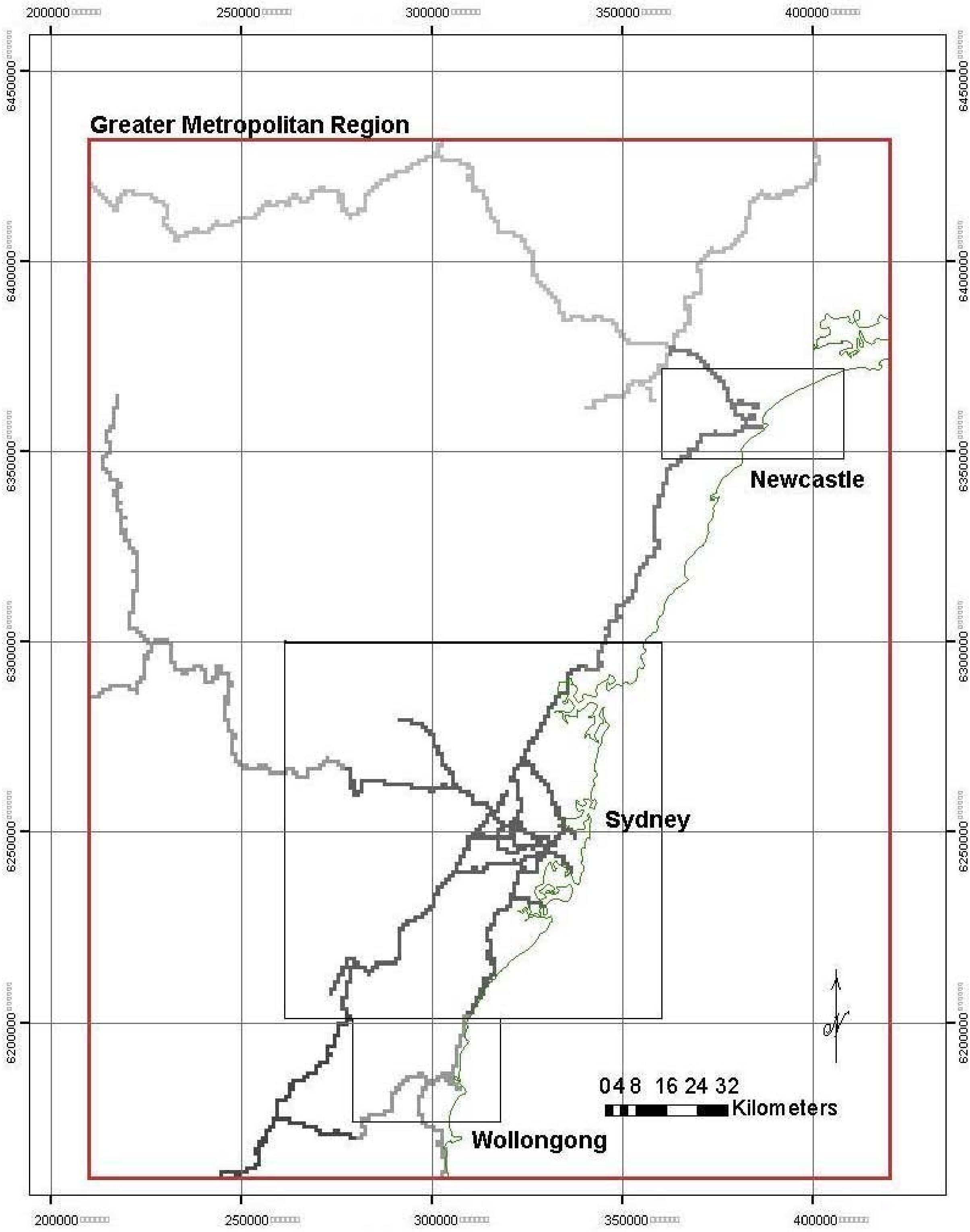

Figure 3.16: Spatial distribution of railways in the GMR

3.8.6 Temporal Variation of Emissions

The following temporal emissions variation profiles have been used for railways:

- Monthly - assumed to vary for each month of the year (Pacific National, 2005);
- Weekly (i.e. Weekday and Weekend day) - assumed to be ~1.15 times higher on weekend days compared with weekdays (Pacific National, 2005); and
- Daily – assumed to vary for each hour of the day. Approximately 5% of emissions occur between 5 am to 10 am and 3 pm to 7 pm, while approximately 95% of emissions occur during the remaining hours. Electric passenger trains have priority during peak hours, while diesel freight locomotives rarely operate during these times (Pacific National, 2005).

Tables 3.94, 3.95 and 3.96 detail the temporal emissions variation profiles that have been used for railways.

Table 3.94: Monthly temporal emissions variation profile for railways

Month	Monthly Temporal Factor		Month	Monthly Temporal Factor	
January	1.26	8.55%	July	1.26	8.49%
February	1.23	8.28%	August	1.15	7.78%
March	1.08	7.29%	September	1.38	9.34%
April	1.00	6.76%	October	1.42	9.61%
May	1.24	8.40%	November	1.36	9.20%
June	1.13	7.61%	December	1.29	8.69%

Table 3.95: Weekly temporal emissions variation profile for railways

Day Type	Weekly Temporal Factor		Day Type	Weekly Temporal Factor	
Weekday	5.0	68.50%	Weekend day	2.3	31.50%

Table 3.96: Daily temporal emissions variation profile for railways

Hour	Weekday Temporal Factor		Weekend day Temporal Factor		Hour	Weekday Temporal Factor		Weekend day Temporal Factor	
1 am	1.15	6.34%	1.15	6.34%	1 pm	1.15	6.34%	1.15	6.34%
2 am	1.15	6.34%	1.15	6.34%	2 pm	1.15	6.34%	1.15	6.34%
3 am	1.15	6.34%	1.15	6.34%	3 pm	0.10	0.55%	0.10	0.55%
4 am	1.15	6.34%	1.15	6.34%	4 pm	0.10	0.55%	0.10	0.55%
5 am	0.10	0.55%	0.10	0.55%	5 pm	0.10	0.55%	0.10	0.55%
6 am	0.10	0.55%	0.10	0.55%	6 pm	0.10	0.55%	0.10	0.55%
7 am	0.10	0.55%	0.10	0.55%	7 pm	1.15	6.34%	1.15	6.34%
8 am	0.10	0.55%	0.10	0.55%	8 pm	1.15	6.34%	1.15	6.34%
9 am	0.10	0.55%	0.10	0.55%	9 pm	1.15	6.34%	1.15	6.34%
10 am	1.15	6.34%	1.15	6.34%	10 pm	1.15	6.34%	1.15	6.34%
11 am	1.15	6.34%	1.15	6.34%	11 pm	1.15	6.34%	1.15	6.34%
12 noon	1.15	6.34%	1.15	6.34%	12 midnight	1.15	6.34%	1.15	6.34%

3.8.7 Emission Estimates

Table 3.97 presents total estimated annual emissions (for selected substances) from railways for the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions. Total estimated annual emissions of all substances from railways are presented in Appendix C.

Table 3.97: Total estimated annual emissions from railways in each region

Substance	Emissions (tonnes/year)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	1.09	1.14×10^{-01}	9.32×10^{-02}	9.75×10^{-01}	2.27
ACETALDEHYDE	2.05	2.14×10^{-01}	1.75×10^{-01}	1.84	4.28
BENZENE	1.20	1.25×10^{-01}	1.02×10^{-01}	1.07	2.49
CARBON MONOXIDE	$2.04 \times 10^{+02}$	$2.13 \times 10^{+01}$	$1.74 \times 10^{+01}$	$1.82 \times 10^{+02}$	$4.25 \times 10^{+02}$
FORMALDEHYDE	6.07	6.32×10^{-01}	5.18×10^{-01}	5.42	$1.26 \times 10^{+01}$
ISOMERS OF XYLENE	1.93×10^{-01}	2.02×10^{-02}	1.65×10^{-02}	1.73×10^{-01}	4.03×10^{-01}
LEAD AND COMPOUNDS	1.13×10^{-03}	1.18×10^{-04}	9.69×10^{-05}	1.01×10^{-03}	2.36×10^{-03}
OXIDES OF NITROGEN	$1.61 \times 10^{+03}$	$1.68 \times 10^{+02}$	$1.37 \times 10^{+02}$	$1.44 \times 10^{+03}$	$3.35 \times 10^{+03}$
PARTICULATE MATTER < 10 µm	$4.79 \times 10^{+01}$	4.99	4.09	$4.28 \times 10^{+01}$	$9.98 \times 10^{+01}$
PARTICULATE MATTER < 2.5 µm	$4.33 \times 10^{+01}$	4.51	3.70	$3.87 \times 10^{+01}$	$9.01 \times 10^{+01}$
POLYCYCLIC AROMATIC HYDROCARBONS	7.08×10^{-01}	7.37×10^{-02}	6.04×10^{-02}	6.32×10^{-01}	1.47
SULFUR DIOXIDE	$2.25 \times 10^{+02}$	$2.34 \times 10^{+01}$	$1.92 \times 10^{+01}$	$2.01 \times 10^{+02}$	$4.68 \times 10^{+02}$
TETRACHLOROETHYLENE	-	-	-	-	-
TOLUENE	1.21	1.26×10^{-01}	1.03×10^{-01}	1.08	2.52
TOTAL SUSPENDED PARTICULATES	$5.04 \times 10^{+01}$	5.25	4.31	$4.51 \times 10^{+01}$	$1.05 \times 10^{+02}$
TOTAL VOCS	$6.91 \times 10^{+01}$	7.20	5.90	$6.18 \times 10^{+01}$	$1.44 \times 10^{+02}$
TRICHLOROETHYLENE	-	-	-	-	-

Tables 3.98, 3.99, 3.100 and 3.101 present total estimated daily emissions (for selected substances) from railways for the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions. These estimates are representative of typical January weekday, January weekend day, July weekday and July weekend day daily emissions.

Table 3.98: Total estimated daily emissions from railways in each region for typical January weekday

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	2.78×10^{-03}	2.89×10^{-04}	2.37×10^{-04}	2.48×10^{-03}	5.79×10^{-03}
ACETALDEHYDE	5.23×10^{-03}	5.45×10^{-04}	4.47×10^{-04}	4.67×10^{-03}	1.09×10^{-02}
BENZENE	3.05×10^{-03}	3.18×10^{-04}	2.60×10^{-04}	2.72×10^{-03}	6.35×10^{-03}
CARBON MONOXIDE	5.20×10^{-01}	5.41×10^{-02}	4.44×10^{-02}	4.64×10^{-01}	1.08
FORMALDEHYDE	1.54×10^{-02}	1.61×10^{-03}	1.32×10^{-03}	1.38×10^{-02}	3.22×10^{-02}
ISOMERS OF XYLENE	4.93×10^{-04}	5.13×10^{-05}	4.21×10^{-05}	4.40×10^{-04}	1.03×10^{-03}
LEAD AND COMPOUNDS	2.89×10^{-06}	3.01×10^{-07}	2.47×10^{-07}	2.58×10^{-06}	6.02×10^{-06}
OXIDES OF NITROGEN	4.09	4.26×10^{-01}	3.50×10^{-01}	3.66	8.53
PARTICULATE MATTER < 10 µm	1.22×10^{-01}	1.27×10^{-02}	1.04×10^{-02}	1.09×10^{-01}	2.54×10^{-01}
PARTICULATE MATTER < 2.5 µm	1.10×10^{-01}	1.15×10^{-02}	9.41×10^{-03}	9.84×10^{-02}	2.29×10^{-01}
POLYCYCLIC AROMATIC HYDROCARBONS	1.80×10^{-03}	1.88×10^{-04}	1.54×10^{-04}	1.61×10^{-03}	3.75×10^{-03}
SULFUR DIOXIDE	5.72×10^{-01}	5.96×10^{-02}	4.89×10^{-02}	5.11×10^{-01}	1.19
TETRACHLOROETHYLENE	-	-	-	-	-
TOLUENE	3.08×10^{-03}	3.21×10^{-04}	2.63×10^{-04}	2.76×10^{-03}	6.42×10^{-03}
TOTAL SUSPENDED PARTICULATES	1.28×10^{-01}	1.34×10^{-02}	1.10×10^{-02}	1.15×10^{-01}	2.67×10^{-01}
TOTAL VOCS	1.76×10^{-01}	1.83×10^{-02}	1.50×10^{-02}	1.57×10^{-01}	3.67×10^{-01}
TRICHLOROETHYLENE	-	-	-	-	-

Table 3.99: Total estimated daily emissions from railways in each region for typical January weekend day

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	3.67×10^{-03}	3.83×10^{-04}	3.14×10^{-04}	3.28×10^{-03}	7.65×10^{-03}
ACETALDEHYDE	6.92×10^{-03}	7.20×10^{-04}	5.91×10^{-04}	6.18×10^{-03}	1.44×10^{-02}
BENZENE	4.03×10^{-03}	4.20×10^{-04}	3.44×10^{-04}	3.60×10^{-03}	8.40×10^{-03}
CARBON MONOXIDE	6.87×10^{-01}	7.16×10^{-02}	5.87×10^{-02}	6.14×10^{-01}	1.43
FORMALDEHYDE	2.04×10^{-02}	2.13×10^{-03}	1.74×10^{-03}	1.83×10^{-02}	4.26×10^{-02}
ISOMERS OF XYLENE	6.51×10^{-04}	6.78×10^{-05}	5.56×10^{-05}	5.82×10^{-04}	1.36×10^{-03}
LEAD AND COMPOUNDS	3.82×10^{-06}	3.98×10^{-07}	3.26×10^{-07}	3.41×10^{-06}	7.96×10^{-06}
OXIDES OF NITROGEN	5.41	5.64×10^{-01}	4.62×10^{-01}	4.84	$1.13 \times 10^{+01}$
PARTICULATE MATTER < 10 µm	1.61×10^{-01}	1.68×10^{-02}	1.38×10^{-02}	1.44×10^{-01}	3.36×10^{-01}
PARTICULATE MATTER < 2.5 µm	1.46×10^{-01}	1.52×10^{-02}	1.24×10^{-02}	1.30×10^{-01}	3.03×10^{-01}
POLYCYCLIC AROMATIC HYDROCARBONS	2.38×10^{-03}	2.48×10^{-04}	2.03×10^{-04}	2.13×10^{-03}	4.96×10^{-03}
SULFUR DIOXIDE	7.57×10^{-01}	7.88×10^{-02}	6.46×10^{-02}	6.76×10^{-01}	1.58
TETRACHLOROETHYLENE	-	-	-	-	-
TOLUENE	4.08×10^{-03}	4.25×10^{-04}	3.48×10^{-04}	3.64×10^{-03}	8.49×10^{-03}
TOTAL SUSPENDED PARTICULATES	1.70×10^{-01}	1.77×10^{-02}	1.45×10^{-02}	1.52×10^{-01}	3.54×10^{-01}
TOTAL VOCS	2.33×10^{-01}	2.42×10^{-02}	1.99×10^{-02}	2.08×10^{-01}	4.85×10^{-01}
TRICHLOROETHYLENE	-	-	-	-	-

Table 3.100: Total estimated daily emissions from railways in each region for typical July weekday

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	2.76×10^{-03}	2.87×10^{-04}	2.36×10^{-04}	2.46×10^{-03}	5.75×10^{-03}
ACETALDEHYDE	5.19×10^{-03}	5.41×10^{-04}	4.44×10^{-04}	4.64×10^{-03}	1.08×10^{-02}
BENZENE	3.03×10^{-03}	3.15×10^{-04}	2.58×10^{-04}	2.70×10^{-03}	6.30×10^{-03}
CARBON MONOXIDE	5.16×10^{-01}	5.37×10^{-02}	4.41×10^{-02}	4.61×10^{-01}	1.07
FORMALDEHYDE	1.53×10^{-02}	1.60×10^{-03}	1.31×10^{-03}	1.37×10^{-02}	3.20×10^{-02}
ISOMERS OF XYLENE	4.89×10^{-04}	5.09×10^{-05}	4.18×10^{-05}	4.37×10^{-04}	1.02×10^{-03}
LEAD AND COMPOUNDS	2.87×10^{-06}	2.99×10^{-07}	2.45×10^{-07}	2.56×10^{-06}	5.97×10^{-06}
OXIDES OF NITROGEN	4.06	4.23×10^{-01}	3.47×10^{-01}	3.63	8.47
PARTICULATE MATTER < 10 µm	1.21×10^{-01}	1.26×10^{-02}	1.03×10^{-02}	1.08×10^{-01}	2.52×10^{-01}
PARTICULATE MATTER < 2.5 µm	1.09×10^{-01}	1.14×10^{-02}	9.34×10^{-03}	9.77×10^{-02}	2.28×10^{-01}
POLYCYCLIC AROMATIC HYDROCARBONS	1.79×10^{-03}	1.86×10^{-04}	1.53×10^{-04}	1.60×10^{-03}	3.73×10^{-03}
SULFUR DIOXIDE	5.68×10^{-01}	5.92×10^{-02}	4.85×10^{-02}	5.08×10^{-01}	1.18
TETRACHLOROETHYLENE	-	-	-	-	-
TOLUENE	3.06×10^{-03}	3.19×10^{-04}	2.61×10^{-04}	2.74×10^{-03}	6.38×10^{-03}
TOTAL SUSPENDED PARTICULATES	1.27×10^{-01}	1.33×10^{-02}	1.09×10^{-02}	1.14×10^{-01}	2.65×10^{-01}
TOTAL VOCS	1.75×10^{-01}	1.82×10^{-02}	1.49×10^{-02}	1.56×10^{-01}	3.64×10^{-01}
TRICHLOROETHYLENE	-	-	-	-	-

Table 3.101: Total estimated daily emissions from railways in each region for typical July weekend day

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	3.65×10^{-03}	3.80×10^{-04}	3.11×10^{-04}	3.26×10^{-03}	7.60×10^{-03}
ACETALDEHYDE	6.87×10^{-03}	7.15×10^{-04}	5.86×10^{-04}	6.14×10^{-03}	1.43×10^{-02}
BENZENE	4.00×10^{-03}	4.17×10^{-04}	3.42×10^{-04}	3.58×10^{-03}	8.34×10^{-03}
CARBON MONOXIDE	6.82×10^{-01}	7.10×10^{-02}	5.83×10^{-02}	6.10×10^{-01}	1.42
FORMALDEHYDE	2.03×10^{-02}	2.11×10^{-03}	1.73×10^{-03}	1.81×10^{-02}	4.22×10^{-02}
ISOMERS OF XYLENE	6.47×10^{-04}	6.74×10^{-05}	5.52×10^{-05}	5.78×10^{-04}	1.35×10^{-03}
LEAD AND COMPOUNDS	3.79×10^{-06}	3.95×10^{-07}	3.24×10^{-07}	3.39×10^{-06}	7.90×10^{-06}
OXIDES OF NITROGEN	5.37	5.60×10^{-01}	4.59×10^{-01}	4.80	$1.12 \times 10^{+01}$
PARTICULATE MATTER < 10 µm	1.60×10^{-01}	1.67×10^{-02}	1.37×10^{-02}	1.43×10^{-01}	3.33×10^{-01}
PARTICULATE MATTER < 2.5 µm	1.45×10^{-01}	1.51×10^{-02}	1.24×10^{-02}	1.29×10^{-01}	3.01×10^{-01}
POLYCYCLIC AROMATIC HYDROCARBONS	2.36×10^{-03}	2.46×10^{-04}	2.02×10^{-04}	2.11×10^{-03}	4.93×10^{-03}
SULFUR DIOXIDE	7.51×10^{-01}	7.82×10^{-02}	6.42×10^{-02}	6.71×10^{-01}	1.56
TETRACHLOROETHYLENE	-	-	-	-	-
TOLUENE	4.05×10^{-03}	4.22×10^{-04}	3.46×10^{-04}	3.62×10^{-03}	8.43×10^{-03}
TOTAL SUSPENDED PARTICULATES	1.68×10^{-01}	1.75×10^{-02}	1.44×10^{-02}	1.51×10^{-01}	3.51×10^{-01}
TOTAL VOCS	2.31×10^{-01}	2.41×10^{-02}	1.97×10^{-02}	2.06×10^{-01}	4.81×10^{-01}
TRICHLOROETHYLENE	-	-	-	-	-

3.8.8 Emission Projection Methodology

Emission projection factors for railways use rail transport oil consumption growth as the surrogate. Emission projection factors for railways have been developed using the following data:

- Rail transport oil consumption growth data (ABARE, 2005b).

Emission projection factors have been developed for every year from 2004 to 2031 (emissions for the base year 2003 are based on the activity data obtained coupled with the emission estimation techniques). Table 3.102 presents the emission projection factors for railways.

Table 3.102: Emission projection factors for railways

Year	Emission Projection Factors [1]	Year	Emission Projection Factors [1]
2004	1.0180	2018	1.3073
2005	1.0364	2019	1.3308
2006	1.0551	2020	1.3548
2007	1.0741	2021	1.3792
2008	1.0934	2022	1.4041
2009	1.1131	2023	1.4294
2010	1.1332	2024	1.4552
2011	1.1536	2025	1.4814
2012	1.1744	2026	1.5081
2013	1.1956	2027	1.5353
2014	1.2171	2028	1.5630
2015	1.2391	2029	1.5911
2016	1.2614	2030	1.6198
2017	1.2841	2031	1.6490

[1] Data Source: (ABARE, 2005b), http://www.abareconomics.com/data_services/excel/TPEC 05.xls?prodid=13183.

3.9 Recreational Boats

3.9.1 Emission Source Description

Emissions of combustion products from recreational boats arise from the use of 2-stroke and 4-stroke petrol and diesel engines. Recreational boats are typically used for cruising, fishing, racing, water skiing and scuba diving. The off-road mobile air emissions inventory includes the following types of recreational boats:

- 2-stroke and 4-stroke petrol fuelled engines;
- Diesel fuelled engines
- Inboard engines;
- Outboard engines; and
- Personal watercraft.

Emissions from commercial boats and commercial ships have been separately estimated for the entire GMR and the results are presented in Sections 3.2 and 3.4 respectively.

3.9.2 Emission Estimation Methodology

Emissions from recreational boats have been estimated using the preferred method (Environment Australia, 1999a), which requires boat type, fuel type and operating hours data to be obtained from a domestic survey. Operating hours data for each boat and fuel type have been combined with time based emission factors to estimate emissions for each substance using the NONROAD2005 Model (USEPA, 2005e). The NONROAD2005 Model estimates emissions for each specific type of recreational boat using the following input data estimates:

- Boat population for base year, distributed by age, power, fuel type, and application;
- Average load factor expressed as average fraction of available power;
- Available power in horsepower;
- Activity in hours of use per year; and
- Emission factor with deterioration and/or new standards.

Emissions from recreational boats have been calculated using the following formula:

$$E_{i,j,k} = EF_{i,j,k} \times SF_{i,j,k} \times OT_{j,k} \times N_{j,k} \text{ x } LF_{j,k}$$

where:

$E_{i,j,k}$	=	Emission of substance i from fuel type j and recreational boat type k	(kg/year)
$EF_{i,j,k}$	=	Time based emission factor of substance i for fuel type j and recreational boat type k	(kg/hr)
$SF_{i,j,k}$	=	NO_x, VOC or PM speciation factor of substance i for fuel type j and recreational boat type k	(%)
$OT_{j,k}$	=	Operating time for fuel type j and recreational boat type k	(hr/year)
$N_{j,k}$	=	Number with fuel type j and recreational boat type k	(Number)
$LF_{j,k}$	=	Load factor for fuel type j and recreational boat type k	(%)

3.9.3 Activity Data

Activity data required for estimating emissions from recreational boats includes:

- 1 km by 1 km gridded total dwelling data for the GMR (ABS, 2001 & TPDC, 2004). The number of total dwellings in the GMR during 2003 was 1,879,572;
- Area of operation (Domestic Survey);
- Recreational boat population, engine power and fuel type (Domestic Survey & OEDA, 2005);
- Frequency, duration and seasonal variation of recreational boat use (Domestic Survey); and
- Average load factor expressed as average fraction of available power (USEPA, 2004c).

Specific details about the information obtained are included in the domestic questionnaire survey form for recreational boats, which is included in Section 7 of Appendix B.

Table 3.103 includes the area of use for recreational boats in the GMR.

Table 3.103: Recreational boats – area of use during 2003 in the GMR

Area of Use [1]	Number of Recreational Boats [1]
Botany Bay	4,060
Broken Bay	20,314
Hawkesbury River	28,449
Hunter River	4,060
Lake Illawarra	4,060
Lake Macquarie	16,255
Nepean River	4,060
Other Rivers	20,314
Parramatta River	4,060
Port Hacking	12,195
Port Jackson	28,449
Port Stephens	4,060
Total Recreational Boats	150,366

[1] Data Source: (Domestic Survey).

Table 3.104 includes the fuel type, number and proportion of households with a recreational boat and average hours of use per year in the GMR.

Table 3.104: Recreational boats – fuel type, number and proportion and average hours of use during 2003 in the GMR

Fuel Type [1]	Number of Recreational Boats [1]	Proportion of Households (%) [1,2]	Average Usage (hours/year) [1]
2-stroke petrol	101,497	5.4	26.5
4-stroke petrol	26,314	1.4	28.9
Diesel	18.796	1.0	16.6
Personal Watercraft	3,759	0.2	16.2
Total Recreational Boats	150,366	8.0 [3]	25.4

[1] Data Source: (Domestic Survey).
[2] Calculated from 1,879,572 total dwellings (ABS, 2001 & TPDC, 2004).
[3] Proportion of households with a powered recreational boat during 2003 in NSW was 10.5% (ABS, 2001; ABS, 2004; AFFA, 2003; MSQ, 2004 & TPDC, 2004).

Figure 3.17 shows the proportion of area of use for recreational boats in the GMR.

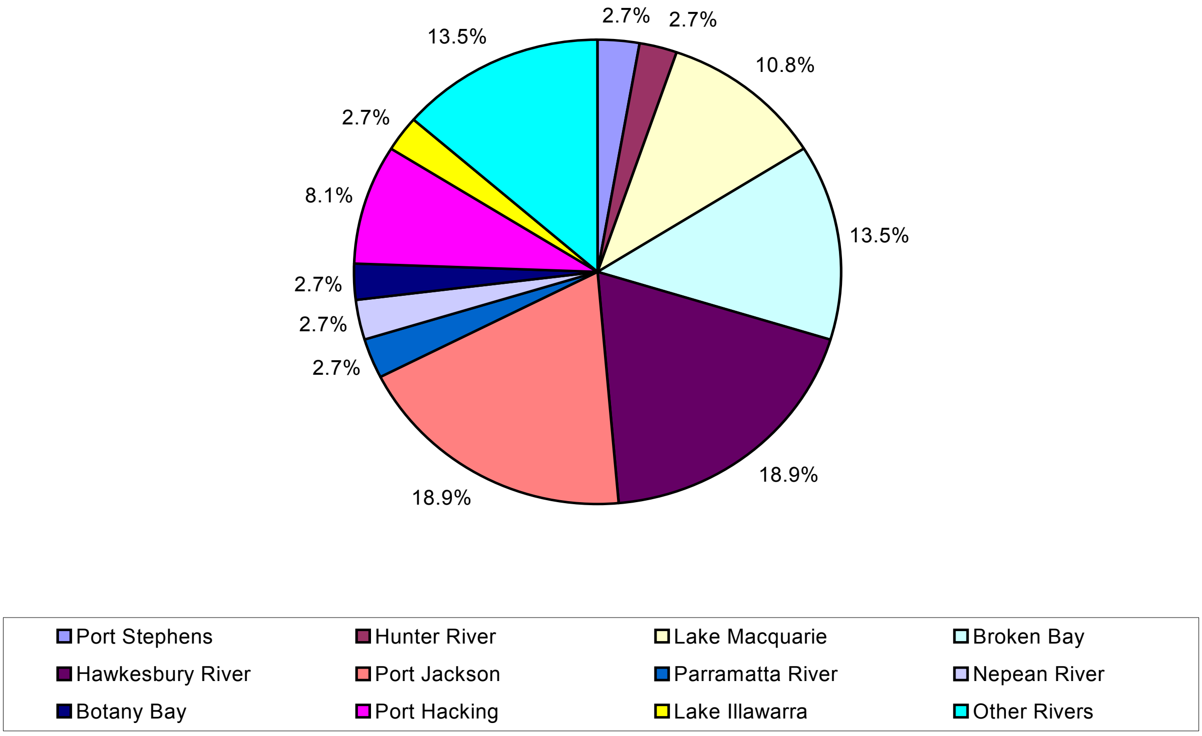

Figure 3.17: Proportion of area of use for recreational boats during 2003 in the GMR

Figure 3.18 shows the proportion of recreational boats with a given fuel type in the GMR.

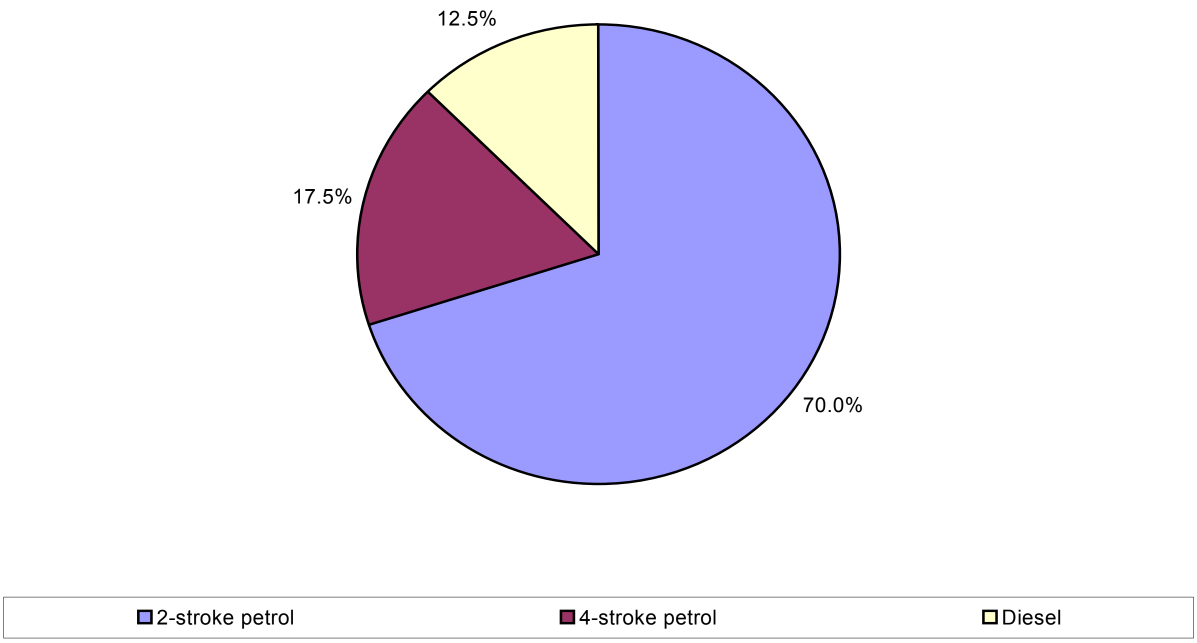

Figure 3.18: Proportion of recreational boats with a given fuel type during 2003 in the GMR

Figure 3.19 shows the proportion of recreational boat ownership in the GMR and NSW.

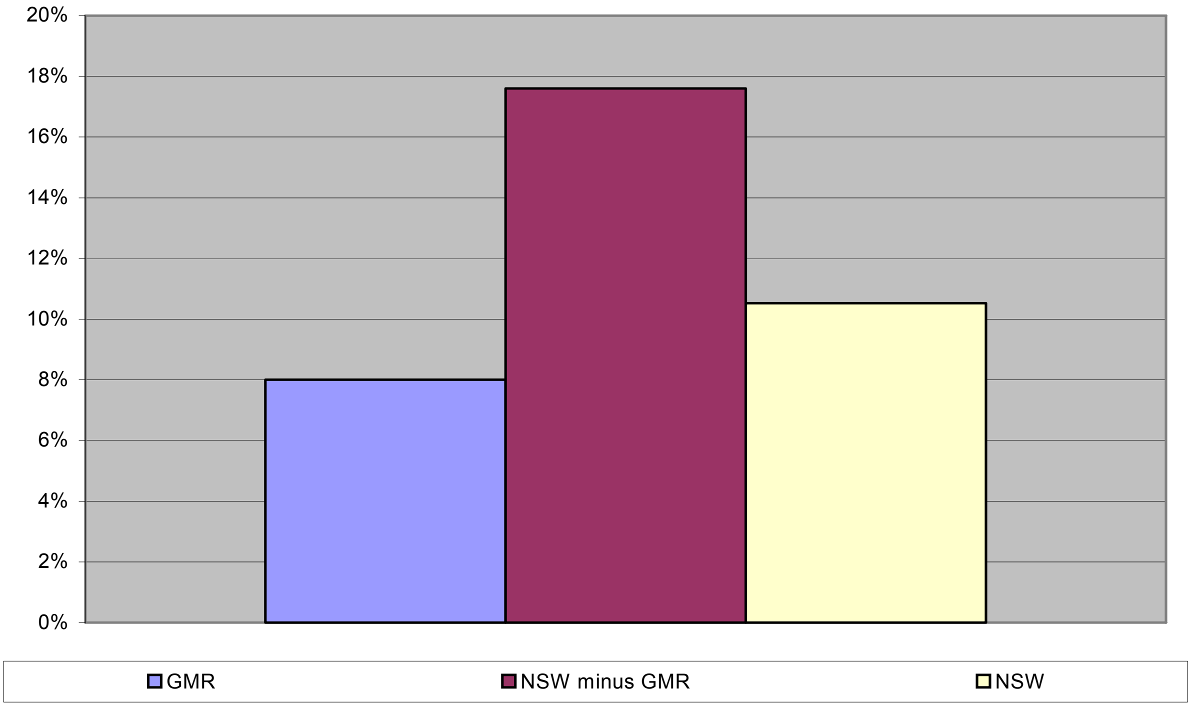

Figure 3.19: Proportion of recreational boat ownership during 2003 in the GMR and NSW

Table 3.105 includes a comparison between total number of recreational boats and outboard engine sales in the GMR and NSW.

Table 3.105: Recreational boats – number and sales during 2003 in the GMR and NSW

Data Source	GMR	NSW	Ratio NSW/GMR
Outboard Engine Sales [1]	8,406	13,285	1.6
Total Recreational Boats	150,366 [2]	268,324 [3]	1.8

[1] Data Source: (OEDA, 2005).
[2] Data Source: (Domestic Survey) (Note: This excludes commercial boats).
[3] Data Source: (ABS, 2001; ABS, 2004; AFFA, 2003; MSQ, 2004 & TPDC, 2004) (Note: This excludes commercial boats).

Table 3.106 includes a comparison between number and sales of 2-stroke and 4-stroke petrol outboard recreational boats in the GMR.

Table 3.106: Recreational boats – number and sales of outboard recreational boats during 2003 in the GMR

Data Source	2-Stroke Petrol	4-Stroke Petrol	Total
Outboard Engine Sales[1]	6,187	2,219	8,406
Outboard Recreational Boats [2]	93,979	11,277	105,256

[1] Data Source: (OEDA, 2005).
[2] Data Source: (Domestic Survey) (Note: This excludes commercial boats).

Figure 3.20 shows the proportion of total number of recreational boats and outboard engine sales in the GMR and NSW.

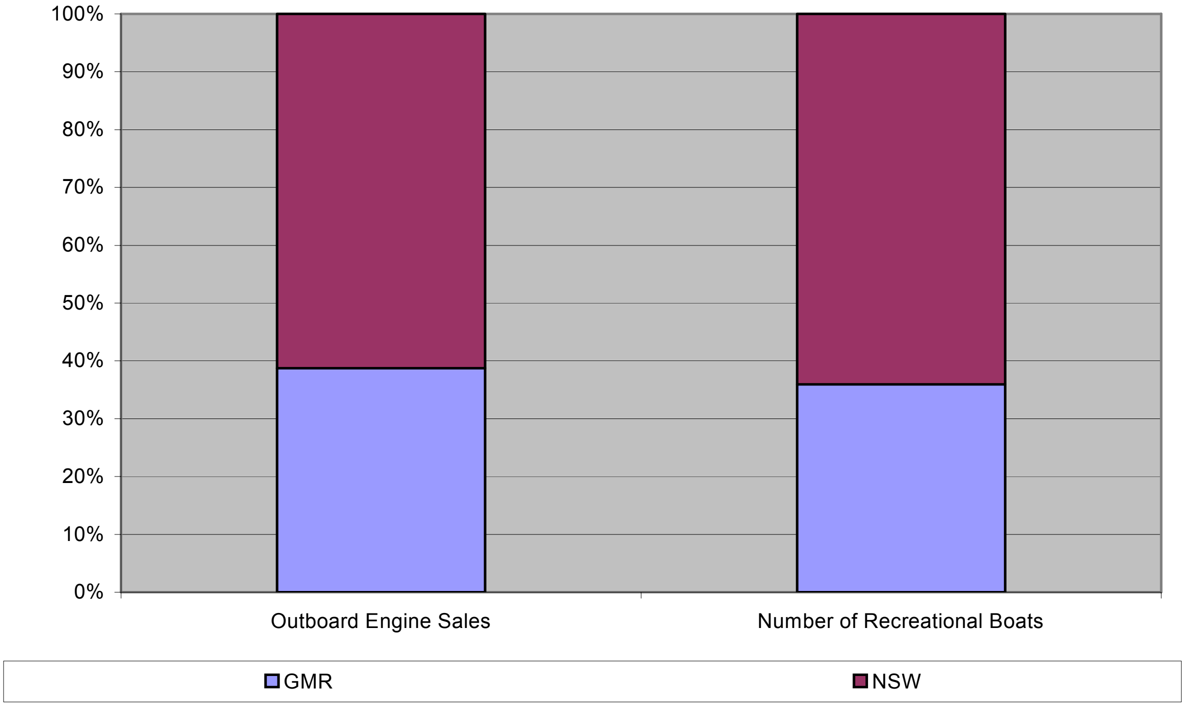

Figure 3.20: Proportion of total number of recreational boats and outboard engine sales during 2003 in the GMR and NSW

Figure 3.21 shows the proportion of 2-stroke petrol and 4-stroke petrol number and sales of outboard engines in the GMR.

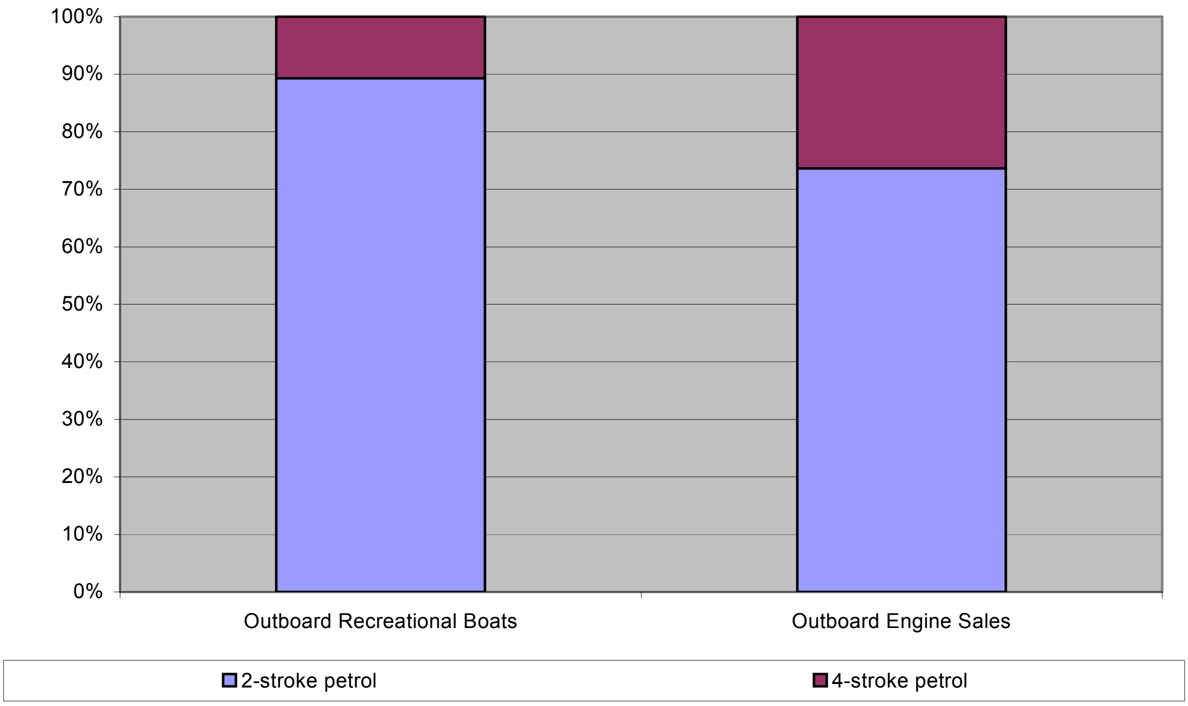

Figure 3.21: Proportion of total number and sales of outboard engines during 2003 in the GMR

Table 3.107 includes the number of recreational boats with a given engine power range in the GMR.

Table 3.107: Recreational boats – engine power range during 2003 in the GMR

Engine Power Range (kW) [1]	Number of Recreational Boats [1]
< 7	22,555
8 to 18	48,719
19 to 37	33,080
38 to 67	24,660
68 to 112	17,743
> 113	3,609
Total Recreational Boats	150,366

[1] Data Source: (Domestic Survey & OEDA, 2005).

Figure 3.22 shows the proportion of recreational boats with a given engine power range in the GMR.

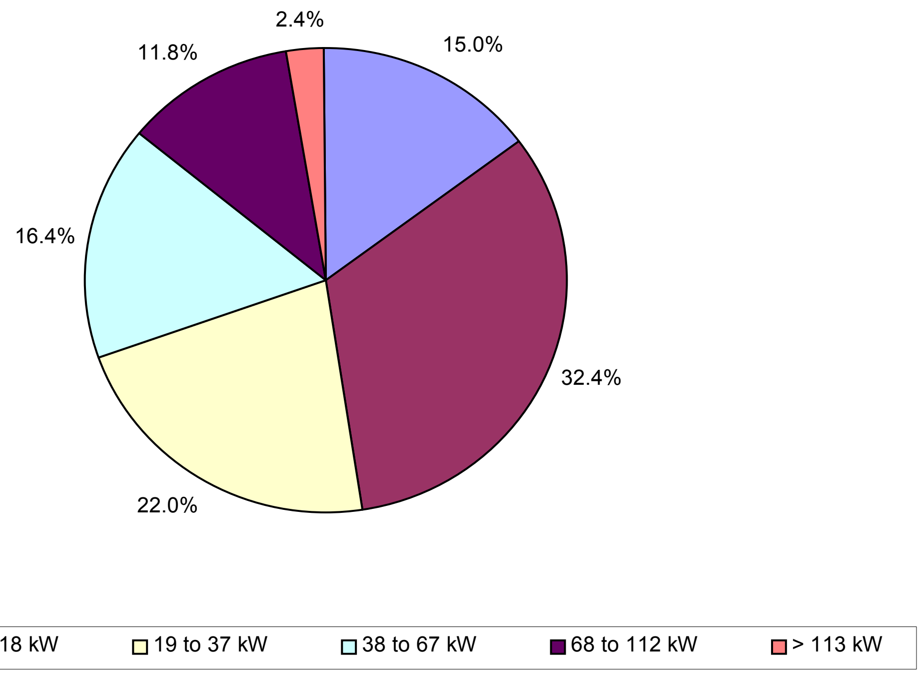

Figure 3.22: Proportion of recreational boats with a given power range during 2003 in the GMR

3.9.4 Emission and Speciation Factors

The emission and speciation factors for all substances from recreational boats are detailed in Table 3.108.

Table 3.108: Emission and speciation factors for all substances from recreational boats

Substance	Fuel Type		Emission Factor Source
CO, NO_x[1], $PM_{2.5}$, PM_{10}, SO_2 & Total VOC	All		(USEPA, 2005e)
TSP	2-stroke & 4-stroke petrol		(Norbeck et. al., 1998)
	Diesel		(Klimont et. al., 2002)
Organic air toxics	2-stroke & 4-stroke petrol		Appendix D (ERG, 2003)
	Diesel		(Pechan, 2006) replacing Profile Number 1201 (USEPA, 2002)
Metal air toxics	All		(Environment Australia, 1999a)
PAH	2-stroke & 4-stroke petrol & Diesel	PM phase	Appendix D (ERG, 2003)
		VOC phase	(Khalili et. al., 1995)
PCDD/PCDF	2-stroke & 4-stroke petrol & Diesel		Appendix D (ERG, 2003)
Speciated VOC & Methane	2-stroke & 4-stroke petrol [2]		Profile Number 1203 (USEPA, 2002)
	Diesel		(Pechan, 2006) replacing Profile Number 1201 (USEPA, 2002)

[1] The default NO_x speciation profile used in the inventory is 5 % NO_2 and 95% NO (USEPA, 2005a).
[2] Profile Number 0000 (USEPA, 2002) for "Unidentified" VOC.

3.9.5 Spatial Distribution of Emissions

Emissions from recreational boats have been spatially distributed according to area of operation from the domestic survey. Total emissions of each substance have been spatially distributed to each 1 km by 1 km grid cell in proportion to the contribution of each recreational boat type in each grid cell. Figure 3.23 shows the spatial distribution of recreational boats in the GMR.

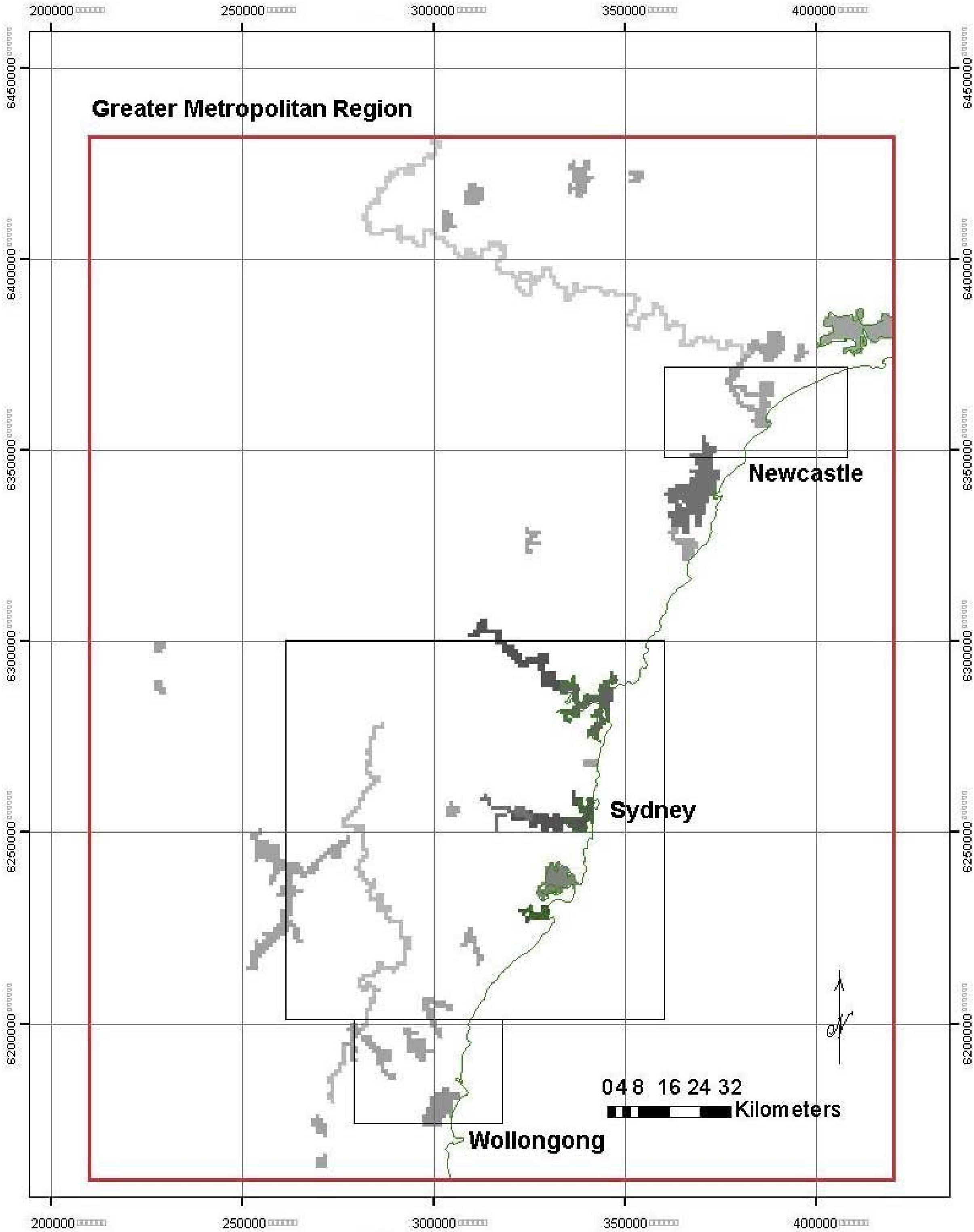

Figure 3.23: Spatial distribution of recreational boats in the GMR

3.9.6 Temporal Variation of Emissions

The following temporal emissions variation profiles have been used for recreational boats:

- Monthly - assumed to vary for each month of the year (Domestic Survey);
- Weekly (i.e. Weekday and Weekend day) - assumed to be ~7 times higher on weekend days compared with week days (Domestic Survey); and
- Daily – assumed to be constant between 8 am and 6 pm (Domestic Survey).

Tables 3.109, 3.110 and 3.111 detail the temporal emissions variation profiles that have been used for recreational boats.

Table 3.109: Monthly temporal emissions variation profile for recreational boats

Month	Monthly Temporal Factor		Month	Monthly Temporal Factor	
January	3.0	11.76%	July	1.0	3.92%
February	3.0	11.76%	August	1.0	3.92%
March	2.0	7.84%	September	2.5	9.80%
April	2.0	7.84%	October	2.5	9.80%
May	2.0	7.84%	November	2.5	9.80%
June	1.0	3.92%	December	3.0	11.76%

Table 3.110: Weekly temporal emissions variation profile for recreational boats

Day Type	Weekly Temporal Factor		Day Type	Weekly Temporal Factor	
Weekday	0.5	26.32%	Weekend day	1.4	73.68%

Table 3.111: Daily temporal emissions variation profile for recreational boats

Hour	Weekday Temporal Factor		Weekend day Temporal Factor		Hour	Weekday Temporal Factor		Weekend day Temporal Factor	
1 am	0	0%	0	0%	1 pm	1	10%	1	10%
2 am	0	0%	0	0%	2 pm	1	10%	1	10%
3 am	0	0%	0	0%	3 pm	1	10%	1	10%
4 am	0	0%	0	0%	4 pm	1	10%	1	10%
5 am	0	0%	0	0%	5 pm	1	10%	1	10%
6 am	0	0%	0	0%	6 pm	0	0%	0	0%
7 am	0	0%	0	0%	7 pm	0	0%	0	0%
8 am	1	10%	1	10%	8 pm	0	0%	0	0%
9 am	1	10%	1	10%	9 pm	0	0%	0	0%
10 am	1	10%	1	10%	10 pm	0	0%	0	0%
11 am	1	10%	1	10%	11 pm	0	0%	0	0%
12 noon	1	10%	1	10%	12 midnight	0	0%	0	0%

3.9.7 Emission Estimates

Table 3.112 presents total estimated annual emissions (for selected substances) from recreational boats for the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions. Total estimated annual emissions of all substances from recreational boats are presented in Appendix C.

Table 3.112: Total estimated annual emissions from recreational boats in each region

Substance	Emissions (tonnes/year)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	4.62	2.20×10^{-01}	2.98×10^{-01}	2.17	7.31
ACETALDEHYDE	1.25	5.97×10^{-02}	8.09×10^{-02}	5.90×10^{-01}	1.99
BENZENE	$3.28 \times 10^{+01}$	1.56	2.12	$1.54 \times 10^{+01}$	$5.19 \times 10^{+01}$
CARBON MONOXIDE	$6.09 \times 10^{+03}$	$2.90 \times 10^{+02}$	$3.93 \times 10^{+02}$	$2.86 \times 10^{+03}$	$9.63 \times 10^{+03}$
FORMALDEHYDE	3.11	1.48×10^{-01}	2.00×10^{-01}	1.46	4.91
ISOMERS OF XYLENE	$1.87 \times 10^{+02}$	8.91	$1.21 \times 10^{+01}$	$8.80 \times 10^{+01}$	$2.96 \times 10^{+02}$
LEAD AND COMPOUNDS	1.07×10^{-04}	5.12×10^{-06}	6.94×10^{-06}	5.05×10^{-05}	1.70×10^{-04}
OXIDES OF NITROGEN	$1.09 \times 10^{+02}$	5.17	7.00	$5.10 \times 10^{+01}$	$1.72 \times 10^{+02}$
PARTICULATE MATTER < 10 µm	$1.47 \times 10^{+02}$	7.00	9.49	$6.91 \times 10^{+01}$	$2.33 \times 10^{+02}$
PARTICULATE MATTER < 2.5 µm	$1.35 \times 10^{+02}$	6.45	8.73	$6.36 \times 10^{+01}$	$2.14 \times 10^{+02}$
POLYCYCLIC AROMATIC HYDROCARBONS	6.35	3.03×10^{-01}	4.10×10^{-01}	2.99	$1.01 \times 10^{+01}$
SULFUR DIOXIDE	$1.35 \times 10^{+01}$	6.45×10^{-01}	8.73×10^{-01}	6.36	$2.14 \times 10^{+01}$
TETRACHLOROETHYLENE	2.18	1.04×10^{-01}	1.41×10^{-01}	1.02	3.45
TOLUENE	$1.53 \times 10^{+02}$	7.27	9.85	$7.18 \times 10^{+01}$	$2.42 \times 10^{+02}$
TOTAL SUSPENDED PARTICULATES	$1.55 \times 10^{+02}$	7.37	9.99	$7.28 \times 10^{+01}$	$2.45 \times 10^{+02}$
TOTAL VOCS	$2.29 \times 10^{+03}$	$1.09 \times 10^{+02}$	$1.48 \times 10^{+02}$	$1.08 \times 10^{+03}$	$3.63 \times 10^{+03}$
TRICHLOROETHYLENE	1.34	6.38×10^{-02}	8.64×10^{-02}	6.29×10^{-01}	2.12

Table 3.113 presents total estimated annual emissions (for selected substances) from recreational boats by fuel type for the GMR.

Table 3.113: Total estimated annual emissions from recreational boats by fuel type

Substance	Emissions (tonnes/year)			
	2-Stroke Petrol	4-Stroke Petrol	Diesel	Total
1,3 BUTADIENE	4.67	2.63	7.01×10^{-03}	7.31
ACETALDEHYDE	7.56×10^{-01}	2.84×10^{-01}	9.45×10^{-01}	1.99
BENZENE	$4.14 \times 10^{+01}$	$1.04 \times 10^{+01}$	6.19×10^{-02}	$5.19 \times 10^{+01}$
CARBON MONOXIDE	$8.18 \times 10^{+03}$	$1.44 \times 10^{+03}$	$1.32 \times 10^{+01}$	$9.63 \times 10^{+03}$
FORMALDEHYDE	2.92	1.49	5.04×10^{-01}	4.91
ISOMERS OF XYLENE	$2.69 \times 10^{+02}$	$2.74 \times 10^{+01}$	7.14×10^{-02}	$2.96 \times 10^{+02}$
LEAD AND COMPOUNDS	-	-	1.70×10^{-04}	1.70×10^{-04}
OXIDES OF NITROGEN	$9.60 \times 10^{+01}$	$3.31 \times 10^{+01}$	$4.26 \times 10^{+01}$	$1.72 \times 10^{+02}$
PARTICULATE MATTER < 10 µm	$2.12 \times 10^{+02}$	$1.79 \times 10^{+01}$	2.60	$2.33 \times 10^{+02}$
PARTICULATE MATTER < 2.5 µm	$1.95 \times 10^{+02}$	$1.64 \times 10^{+01}$	2.53	$2.14 \times 10^{+02}$
POLYCYCLIC AROMATIC HYDROCARBONS	7.52	2.50	3.37×10^{-02}	$1.01 \times 10^{+01}$
SULFUR DIOXIDE	9.18	1.66	$1.06 \times 10^{+01}$	$2.14 \times 10^{+01}$
TETRACHLOROETHYLENE	3.21	2.35×10^{-01}	-	3.45
TOLUENE	$2.11 \times 10^{+02}$	$3.09 \times 10^{+01}$	9.00×10^{-02}	$2.42 \times 10^{+02}$
TOTAL SUSPENDED PARTICULATES	$2.23 \times 10^{+02}$	$1.88 \times 10^{+01}$	2.74	$2.45 \times 10^{+02}$
TOTAL VOCS	$3.32 \times 10^{+03}$	$2.99 \times 10^{+02}$	4.18	$3.63 \times 10^{+03}$
TRICHLOROETHYLENE	1.97	1.45×10^{-01}	-	2.12

Tables 3.114, 3.115, 3.116 and 3.117 present total estimated daily emissions (for selected substances) from recreational boats for the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions. These estimates are representative of typical January weekday, January weekend day, July weekday and July weekend day daily emissions.

Table 3.114: Total estimated daily emissions from recreational boats in each region for typical January weekday

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	6.22×10^{-03}	2.96×10^{-04}	4.01×10^{-04}	2.92×10^{-03}	9.83×10^{-03}
ACETALDEHYDE	1.69×10^{-03}	8.04×10^{-05}	1.09×10^{-04}	7.94×10^{-04}	2.67×10^{-03}
BENZENE	4.41×10^{-02}	2.10×10^{-03}	2.85×10^{-03}	2.07×10^{-02}	6.98×10^{-02}
CARBON MONOXIDE	8.20	3.90×10^{-01}	5.29×10^{-01}	3.85	$1.30 \times 10^{+01}$
FORMALDEHYDE	4.18×10^{-03}	1.99×10^{-04}	2.70×10^{-04}	1.97×10^{-03}	6.62×10^{-03}
ISOMERS OF XYLENE	2.52×10^{-01}	1.20×10^{-02}	1.63×10^{-02}	1.18×10^{-01}	3.99×10^{-01}
LEAD AND COMPOUNDS	1.45×10^{-07}	6.89×10^{-09}	9.34×10^{-09}	6.80×10^{-08}	2.29×10^{-07}
OXIDES OF NITROGEN	1.46×10^{-01}	6.96×10^{-03}	9.42×10^{-03}	6.87×10^{-02}	2.31×10^{-01}
PARTICULATE MATTER < 10 µm	1.98×10^{-01}	9.43×10^{-03}	1.28×10^{-02}	9.31×10^{-02}	3.13×10^{-01}
PARTICULATE MATTER < 2.5 µm	1.82×10^{-01}	8.68×10^{-03}	1.18×10^{-02}	8.57×10^{-02}	2.88×10^{-01}
POLYCYCLIC AROMATIC HYDROCARBONS	8.55×10^{-03}	4.07×10^{-04}	5.52×10^{-04}	4.02×10^{-03}	1.35×10^{-02}
SULFUR DIOXIDE	1.82×10^{-02}	8.68×10^{-04}	1.18×10^{-03}	8.56×10^{-03}	2.88×10^{-02}
TETRACHLOROETHYLENE	2.93×10^{-03}	1.40×10^{-04}	1.89×10^{-04}	1.38×10^{-03}	4.64×10^{-03}
TOLUENE	2.06×10^{-01}	9.79×10^{-03}	1.33×10^{-02}	9.66×10^{-02}	3.25×10^{-01}
TOTAL SUSPENDED PARTICULATES	2.08×10^{-01}	9.92×10^{-03}	1.34×10^{-02}	9.80×10^{-02}	3.30×10^{-01}
TOTAL VOCS	3.08	1.47×10^{-01}	1.99×10^{-01}	1.45	4.88
TRICHLOROETHYLENE	1.80×10^{-03}	8.58×10^{-05}	1.16×10^{-04}	8.47×10^{-04}	2.85×10^{-03}

Table 3.115: Total estimated daily emissions from recreational boats in each region for typical January weekend day

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	5.00×10^{-02}	2.38×10^{-03}	3.23×10^{-03}	2.35×10^{-02}	7.92×10^{-02}
ACETALDEHYDE	1.36×10^{-02}	6.47×10^{-04}	8.77×10^{-04}	6.39×10^{-03}	2.15×10^{-02}
BENZENE	3.55×10^{-01}	1.69×10^{-02}	2.29×10^{-02}	1.67×10^{-01}	5.62×10^{-01}
CARBON MONOXIDE	$6.60 \times 10^{+01}$	3.14	4.26	$3.10 \times 10^{+01}$	$1.04 \times 10^{+02}$
FORMALDEHYDE	3.37×10^{-02}	1.60×10^{-03}	2.17×10^{-03}	1.58×10^{-02}	5.33×10^{-02}
ISOMERS OF XYLENE	2.03	9.66×10^{-02}	1.31×10^{-01}	9.53×10^{-01}	3.21
LEAD AND COMPOUNDS	1.16×10^{-06}	5.55×10^{-08}	7.51×10^{-08}	5.48×10^{-07}	1.84×10^{-06}
OXIDES OF NITROGEN	1.18	5.60×10^{-02}	7.59×10^{-02}	5.53×10^{-01}	1.86
PARTICULATE MATTER < 10 µm	1.59	7.59×10^{-02}	1.03×10^{-01}	7.49×10^{-01}	2.52
PARTICULATE MATTER < 2.5 µm	1.47	6.99×10^{-02}	9.46×10^{-02}	6.90×10^{-01}	2.32
POLYCYCLIC AROMATIC HYDROCARBONS	6.88×10^{-02}	3.28×10^{-03}	4.44×10^{-03}	3.24×10^{-02}	1.09×10^{-01}
SULFUR DIOXIDE	1.47×10^{-01}	6.98×10^{-03}	9.46×10^{-03}	6.89×10^{-02}	2.32×10^{-01}
TETRACHLOROETHYLENE	2.36×10^{-02}	1.12×10^{-03}	1.52×10^{-03}	1.11×10^{-02}	3.74×10^{-02}
TOLUENE	1.66	7.88×10^{-02}	1.07×10^{-01}	7.78×10^{-01}	2.62
TOTAL SUSPENDED PARTICULATES	1.68	7.99×10^{-02}	1.08×10^{-01}	7.89×10^{-01}	2.65
TOTAL VOCS	$2.48 \times 10^{+01}$	1.18	1.60	$1.17 \times 10^{+01}$	$3.93 \times 10^{+01}$
TRICHLOROETHYLENE	1.45×10^{-02}	6.91×10^{-04}	9.36×10^{-04}	6.82×10^{-03}	2.30×10^{-02}

Table 3.116: Total estimated daily emissions from recreational boats in each region for typical July weekday

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	2.07×10^{-03}	9.87×10^{-05}	1.34×10^{-04}	9.74×10^{-04}	3.28×10^{-03}
ACETALDEHYDE	5.63×10^{-04}	2.68×10^{-05}	3.63×10^{-05}	2.65×10^{-04}	8.91×10^{-04}
BENZENE	1.47×10^{-02}	7.01×10^{-04}	9.49×10^{-04}	6.92×10^{-03}	2.33×10^{-02}
CARBON MONOXIDE	2.73	1.30×10^{-01}	1.76×10^{-01}	1.28	4.32
FORMALDEHYDE	1.39×10^{-03}	6.64×10^{-05}	8.99×10^{-05}	6.55×10^{-04}	2.21×10^{-03}
ISOMERS OF XYLENE	8.40×10^{-02}	4.00×10^{-03}	5.42×10^{-03}	3.95×10^{-02}	1.33×10^{-01}
LEAD AND COMPOUNDS	4.82×10^{-08}	2.30×10^{-09}	3.11×10^{-09}	2.27×10^{-08}	7.63×10^{-08}
OXIDES OF NITROGEN	4.87×10^{-02}	2.32×10^{-03}	3.14×10^{-03}	2.29×10^{-02}	7.70×10^{-02}
PARTICULATE MATTER < 10 µm	6.60×10^{-02}	3.14×10^{-03}	4.26×10^{-03}	3.10×10^{-02}	1.04×10^{-01}
PARTICULATE MATTER < 2.5 µm	6.07×10^{-02}	2.89×10^{-03}	3.92×10^{-03}	2.86×10^{-02}	9.61×10^{-02}
POLYCYCLIC AROMATIC HYDROCARBONS	2.85×10^{-03}	1.36×10^{-04}	1.84×10^{-04}	1.34×10^{-03}	4.51×10^{-03}
SULFUR DIOXIDE	6.07×10^{-03}	2.89×10^{-04}	3.92×10^{-04}	2.85×10^{-03}	9.61×10^{-03}
TETRACHLOROETHYLENE	9.78×10^{-04}	4.66×10^{-05}	6.31×10^{-05}	4.60×10^{-04}	1.55×10^{-03}
TOLUENE	6.85×10^{-02}	3.26×10^{-03}	4.42×10^{-03}	3.22×10^{-02}	1.08×10^{-01}
TOTAL SUSPENDED PARTICULATES	6.95×10^{-02}	3.31×10^{-03}	4.48×10^{-03}	3.27×10^{-02}	1.10×10^{-01}
TOTAL VOCS	1.03	4.90×10^{-02}	6.63×10^{-02}	4.83×10^{-01}	1.63
TRICHLOROETHYLENE	6.01×10^{-04}	2.86×10^{-05}	3.88×10^{-05}	2.82×10^{-04}	9.51×10^{-04}

Table 3.117: Total estimated daily emissions from recreational boats in each region for typical July weekend day

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	1.67×10^{-02}	7.94×10^{-04}	1.08×10^{-03}	7.84×10^{-03}	2.64×10^{-02}
ACETALDEHYDE	4.53×10^{-03}	2.16×10^{-04}	2.92×10^{-04}	2.13×10^{-03}	7.17×10^{-03}
BENZENE	1.18×10^{-01}	5.64×10^{-03}	7.64×10^{-03}	5.57×10^{-02}	1.87×10^{-01}
CARBON MONOXIDE	$2.20 \times 10^{+01}$	1.05	1.42	$1.03 \times 10^{+01}$	$3.48 \times 10^{+01}$
FORMALDEHYDE	1.12×10^{-02}	5.34×10^{-04}	7.24×10^{-04}	5.27×10^{-03}	1.78×10^{-02}
ISOMERS OF XYLENE	6.76×10^{-01}	3.22×10^{-02}	4.36×10^{-02}	3.18×10^{-01}	1.07
LEAD AND COMPOUNDS	3.88×10^{-07}	1.85×10^{-08}	2.50×10^{-08}	1.83×10^{-07}	6.14×10^{-07}
OXIDES OF NITROGEN	3.92×10^{-01}	1.87×10^{-02}	2.53×10^{-02}	1.84×10^{-01}	6.20×10^{-01}
PARTICULATE MATTER < 10 µm	5.31×10^{-01}	2.53×10^{-02}	3.43×10^{-02}	2.50×10^{-01}	8.40×10^{-01}
PARTICULATE MATTER < 2.5 µm	4.89×10^{-01}	2.33×10^{-02}	3.15×10^{-02}	2.30×10^{-01}	7.74×10^{-01}
POLYCYCLIC AROMATIC HYDROCARBONS	2.29×10^{-02}	1.09×10^{-03}	1.48×10^{-03}	1.08×10^{-02}	3.63×10^{-02}
SULFUR DIOXIDE	4.89×10^{-02}	2.33×10^{-03}	3.15×10^{-03}	2.30×10^{-02}	7.73×10^{-02}
TETRACHLOROETHYLENE	7.87×10^{-03}	3.75×10^{-04}	5.08×10^{-04}	3.70×10^{-03}	1.25×10^{-02}
TOLUENE	5.52×10^{-01}	2.63×10^{-02}	3.56×10^{-02}	2.59×10^{-01}	8.73×10^{-01}
TOTAL SUSPENDED PARTICULATES	5.59×10^{-01}	2.66×10^{-02}	3.61×10^{-02}	2.63×10^{-01}	8.85×10^{-01}
TOTAL VOCS	8.28	3.94×10^{-01}	5.34×10^{-01}	3.89	$1.31 \times 10^{+01}$
TRICHLOROETHYLENE	4.84×10^{-03}	2.30×10^{-04}	3.12×10^{-04}	2.27×10^{-03}	7.65×10^{-03}

3.9.8 Emission Projection Methodology

Emission projection factors for recreational boats use dwelling growth as the surrogate. Emission projection factors for recreational boats were developed using the following data:

- Dwelling growth data (ABS, 2001 & TPDC, 2004).

Emission projection factors have been developed for every year from 2004 to 2031 (emissions for the base year 2003 are based on the activity data obtained coupled with the emission estimation techniques). Table 3.118 presents the emission projection factors for recreational boats.

Table 3.118: Emission projection factors for recreational boats

Year	Emission Projection Factors [1]	Year	Emission Projection Factors [1]
2004	1.0125	2018	1.2026
2005	1.0249	2019	1.2158
2006	1.0374	2020	1.2290
2007	1.0513	2021	1.2422
2008	1.0652	2022	1.2558
2009	1.0791	2023	1.2695
2010	1.0930	2024	1.2831
2011	1.1070	2025	1.2967
2012	1.1208	2026	1.3103
2013	1.1346	2027	1.3238
2014	1.1485	2028	1.3374
2015	1.1623	2029	1.3509
2016	1.1761	2030	1.3644
2017	1.1894	2031	1.3780

[1] Data Source: (ABS, 2001 & TPDC, 2004).

4 Emissions Summary

The off-road mobile air emissions inventory has been developed for the 2003 calendar year, which incorporates an area covering greater Sydney, Newcastle and Wollongong, known as the Greater Metropolitan Region (GMR).

The off-road mobile air emissions inventory includes emissions from the following sources:

- Aircraft;
- Commercial boats;
- Commercial off-road vehicles and equipment;
- Commercial ships;
- Construction off-road vehicles and equipment;
- Industrial off-road vehicles and equipment;
- Loading and unloading petroleum products;
- Railways; and
- Recreational boats.

The pollutants inventoried include criteria pollutants specified in the Air NEPM (NEPC, 2003), air toxics associated with the National Pollutant Inventory (NEPC, 2000) and the Air Toxics NEPM (NEPC, 2004) and any other pollutants associated with state specific programs, i.e. Load Based Licensing (Protection of the Environment Operations (General) Regulation 1998 (PCO, 1998)) and Protection of the Environment Operations (Clean Air) Regulation 2002 (PCO, 2005).

Table 4.1 shows total estimated annual emissions (for selected substances) from all off-road mobile sources in the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions.

Figure 4.1 shows the proportion of total estimated annual emissions (for selected substances) from all off-road mobile sources in the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions.

Tables 4.2, 4.3, 4.4 and 4.5 show total estimated daily emissions[3] (for selected substances) from all off-road mobile sources in the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions. These estimates are representative of typical January weekday, January weekend day, July weekday and July weekend day daily emissions.

Figures 4.2, 4.3, 4.4 and 4.5 show the proportion of total estimated daily emissions (for selected substances) from all off-road mobile sources in the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions. These estimates are representative of typical January weekday, January weekend day, July weekday and July weekend day daily emissions.

[3] Daily emissions for sources that don't vary monthly use 261 weekdays and 104 weekend days during 2003. Daily emissions in January and July for sources that vary monthly use 23 weekdays and 8 weekend days during 2003.

Table 4.1: Total estimated annual emissions from off-road mobile sources in each region

Substance	Emissions (tonnes/year)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	$1.60 \times 10^{+01}$	3.15	8.77×10^{-01}	6.78	$2.68 \times 10^{+01}$
ACETALDEHYDE	$1.14 \times 10^{+02}$	$2.29 \times 10^{+01}$	7.83	$1.12 \times 10^{+02}$	$2.57 \times 10^{+02}$
BENZENE	$6.57 \times 10^{+01}$	5.52	3.56	$3.85 \times 10^{+01}$	$1.13 \times 10^{+02}$
CARBON MONOXIDE	$2.03 \times 10^{+04}$	$1.45 \times 10^{+03}$	$7.93 \times 10^{+02}$	$9.65 \times 10^{+03}$	$3.21 \times 10^{+04}$
FORMALDEHYDE	$1.17 \times 10^{+02}$	$2.00 \times 10^{+01}$	5.49	$6.97 \times 10^{+01}$	$2.12 \times 10^{+02}$
ISOMERS OF XYLENE	$2.45 \times 10^{+02}$	$1.56 \times 10^{+01}$	$1.56 \times 10^{+01}$	$1.56 \times 10^{+02}$	$4.32 \times 10^{+02}$
LEAD AND COMPOUNDS	$1.33 \times 10^{+01}$	1.44	1.89	$3.83 \times 10^{+01}$	$5.49 \times 10^{+01}$
OXIDES OF NITROGEN	$9.51 \times 10^{+03}$	$2.95 \times 10^{+03}$	$9.14 \times 10^{+02}$	$1.01 \times 10^{+04}$	$2.35 \times 10^{+04}$
PARTICULATE MATTER < 10 µm	$3.71 \times 10^{+03}$	$4.69 \times 10^{+02}$	$5.08 \times 10^{+02}$	$9.88 \times 10^{+03}$	$1.46 \times 10^{+04}$
PARTICULATE MATTER < 2.5 µm	$1.76 \times 10^{+03}$	$2.53 \times 10^{+02}$	$2.28 \times 10^{+02}$	$4.24 \times 10^{+03}$	$6.49 \times 10^{+03}$
POLYCYCLIC AROMATIC HYDROCARBONS	$2.76 \times 10^{+01}$	1.97	8.65×10^{-01}	9.50	$4.00 \times 10^{+01}$
SULFUR DIOXIDE	$1.37 \times 10^{+03}$	$1.26 \times 10^{+03}$	$2.50 \times 10^{+02}$	$1.28 \times 10^{+03}$	$4.17 \times 10^{+03}$
TETRACHLOROETHYLENE	2.50	1.39×10^{-01}	1.62×10^{-01}	1.47	4.27
TOLUENE	$2.18 \times 10^{+02}$	$1.43 \times 10^{+01}$	$1.34 \times 10^{+01}$	$1.38 \times 10^{+02}$	$3.83 \times 10^{+02}$
TOTAL SUSPENDED PARTICULATES	$1.55 \times 10^{+04}$	$1.77 \times 10^{+03}$	$2.22 \times 10^{+03}$	$4.46 \times 10^{+04}$	$6.41 \times 10^{+04}$
TOTAL VOCS	$4.77 \times 10^{+03}$	$3.12 \times 10^{+02}$	$2.32 \times 10^{+02}$	$2.32 \times 10^{+03}$	$7.64 \times 10^{+03}$
TRICHLOROETHYLENE	1.54	8.51×10^{-02}	9.97×10^{-02}	9.03×10^{-01}	2.62

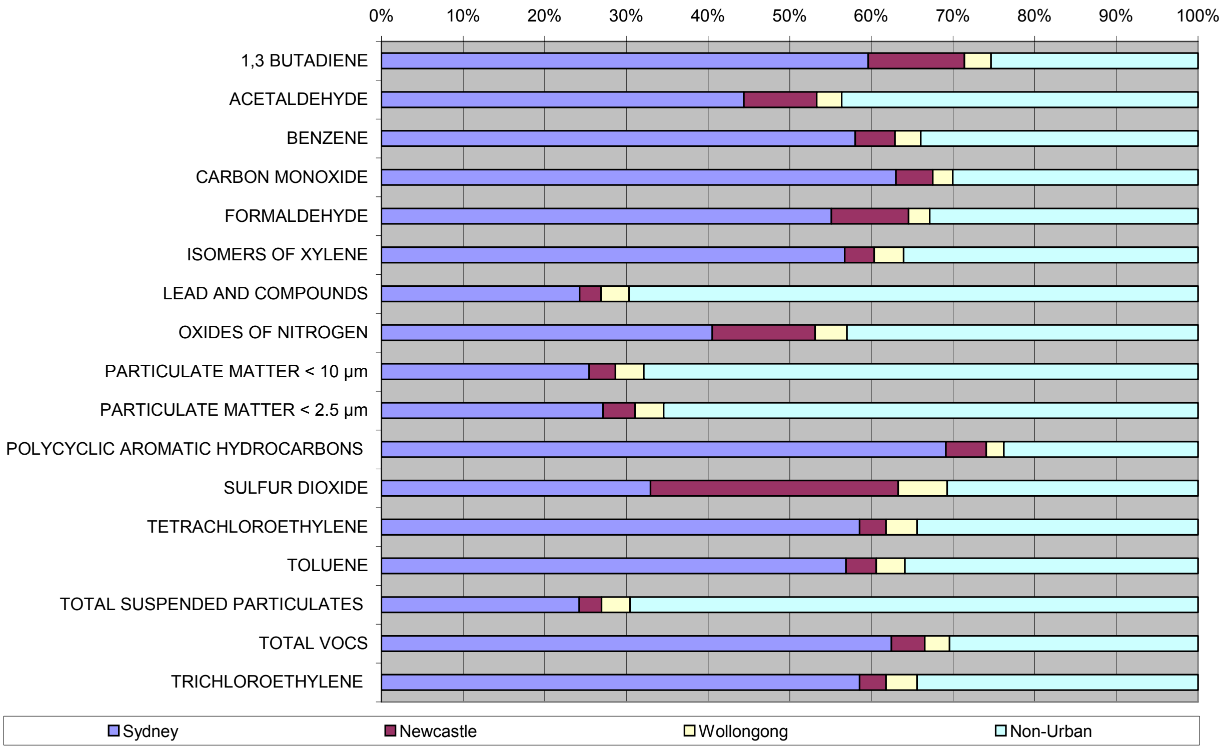

Figure 4.1: Proportion of total estimated annual emissions from off-road mobile sources in each region

Table 4.2: Total estimated daily emissions from off-road mobile sources in each region for typical January weekday

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	3.62×10^{-02}	7.84×10^{-03}	1.88×10^{-03}	1.48×10^{-02}	6.07×10^{-02}
ACETALDEHYDE	2.91×10^{-01}	5.81×10^{-02}	1.88×10^{-02}	2.63×10^{-01}	6.31×10^{-01}
BENZENE	1.32×10^{-01}	1.26×10^{-02}	6.63×10^{-03}	8.15×10^{-02}	2.32×10^{-01}
CARBON MONOXIDE	$4.59 \times 10^{+01}$	3.44	1.55	$2.12 \times 10^{+01}$	$7.21 \times 10^{+01}$
FORMALDEHYDE	3.01×10^{-01}	5.11×10^{-02}	1.32×10^{-02}	1.64×10^{-01}	5.29×10^{-01}
ISOMERS OF XYLENE	4.12×10^{-01}	3.03×10^{-02}	2.59×10^{-02}	3.04×10^{-01}	7.72×10^{-01}
LEAD AND COMPOUNDS	2.98×10^{-02}	3.22×10^{-03}	4.15×10^{-03}	8.41×10^{-02}	1.21×10^{-01}
OXIDES OF NITROGEN	$2.42 \times 10^{+01}$	7.49	2.25	$2.42 \times 10^{+01}$	$5.82 \times 10^{+01}$
PARTICULATE MATTER < 10 µm	8.25	1.07	1.12	$2.18 \times 10^{+01}$	$3.22 \times 10^{+01}$
PARTICULATE MATTER < 2.5 µm	3.92	5.93×10^{-01}	5.03×10^{-01}	9.38	$1.44 \times 10^{+01}$
POLYCYCLIC AROMATIC HYDROCARBONS	6.48×10^{-02}	4.74×10^{-03}	1.69×10^{-03}	2.02×10^{-02}	9.15×10^{-02}
SULFUR DIOXIDE	3.51	3.23	6.34×10^{-01}	3.22	$1.06 \times 10^{+01}$
TETRACHLOROETHYLENE	3.83×10^{-03}	2.37×10^{-04}	2.50×10^{-04}	2.62×10^{-03}	6.94×10^{-03}
TOLUENE	3.82×10^{-01}	2.87×10^{-02}	2.29×10^{-02}	2.75×10^{-01}	7.09×10^{-01}
TOTAL SUSPENDED PARTICULATES	$3.45 \times 10^{+01}$	3.97	4.88	$9.81 \times 10^{+01}$	$1.41 \times 10^{+02}$
TOTAL VOCS	9.41	6.77×10^{-01}	4.13×10^{-01}	4.62	$1.51 \times 10^{+01}$
TRICHLOROETHYLENE	2.35×10^{-03}	1.46×10^{-04}	1.53×10^{-04}	1.61×10^{-03}	4.26×10^{-03}

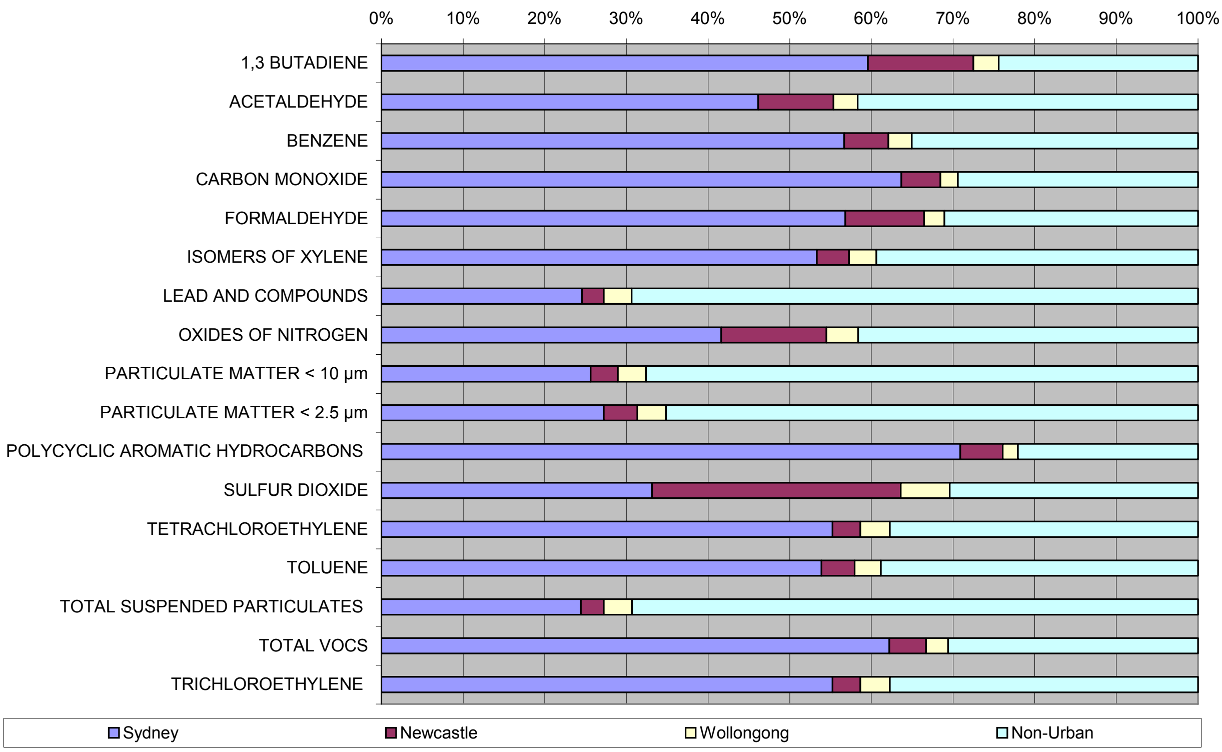

Figure 4.2: Proportion of total estimated daily emissions from off-road mobile sources in each region for typical January weekday

Table 4.3: Total estimated daily emissions from off-road mobile sources in each region for typical January weekend day

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	8.03×10^{-02}	1.04×10^{-02}	4.83×10^{-03}	3.60×10^{-02}	1.32×10^{-01}
ACETALDEHYDE	2.89×10^{-01}	6.02×10^{-02}	1.82×10^{-02}	2.34×10^{-01}	6.01×10^{-01}
BENZENE	4.35×10^{-01}	2.73×10^{-02}	2.65×10^{-02}	2.24×10^{-01}	7.13×10^{-01}
CARBON MONOXIDE	$1.02 \times 10^{+02}$	6.15	5.21	$4.69 \times 10^{+01}$	$1.60 \times 10^{+02}$
FORMALDEHYDE	3.24×10^{-01}	5.42×10^{-02}	1.48×10^{-02}	1.64×10^{-01}	5.57×10^{-01}
ISOMERS OF XYLENE	2.17	1.14×10^{-01}	1.40×10^{-01}	1.13	3.55
LEAD AND COMPOUNDS	2.46×10^{-02}	2.67×10^{-03}	3.23×10^{-03}	6.61×10^{-02}	9.66×10^{-02}
OXIDES OF NITROGEN	$2.57 \times 10^{+01}$	8.03	2.37	$2.35 \times 10^{+01}$	$5.96 \times 10^{+01}$
PARTICULATE MATTER < 10 µm	8.38	1.02	9.83×10^{-01}	$1.80 \times 10^{+01}$	$2.84 \times 10^{+01}$
PARTICULATE MATTER < 2.5 µm	4.70	6.14×10^{-01}	4.96×10^{-01}	8.16	$1.40 \times 10^{+01}$
POLYCYCLIC AROMATIC HYDROCARBONS	1.24×10^{-01}	7.71×10^{-03}	5.57×10^{-03}	4.75×10^{-02}	1.85×10^{-01}
SULFUR DIOXIDE	3.93	3.48	6.96×10^{-01}	3.53	$1.16 \times 10^{+01}$
TETRACHLOROETHYLENE	2.44×10^{-02}	1.21×10^{-03}	1.58×10^{-03}	1.23×10^{-02}	3.95×10^{-02}
TOLUENE	1.81	9.69×10^{-02}	1.16×10^{-01}	9.44×10^{-01}	2.97
TOTAL SUSPENDED PARTICULATES	$3.00 \times 10^{+01}$	3.42	3.92	$7.79 \times 10^{+01}$	$1.15 \times 10^{+02}$
TOTAL VOCS	$2.95 \times 10^{+01}$	1.72	1.80	$1.46 \times 10^{+01}$	$4.77 \times 10^{+01}$
TRICHLOROETHYLENE	1.50×10^{-02}	7.46×10^{-04}	9.71×10^{-04}	7.53×10^{-03}	2.43×10^{-02}

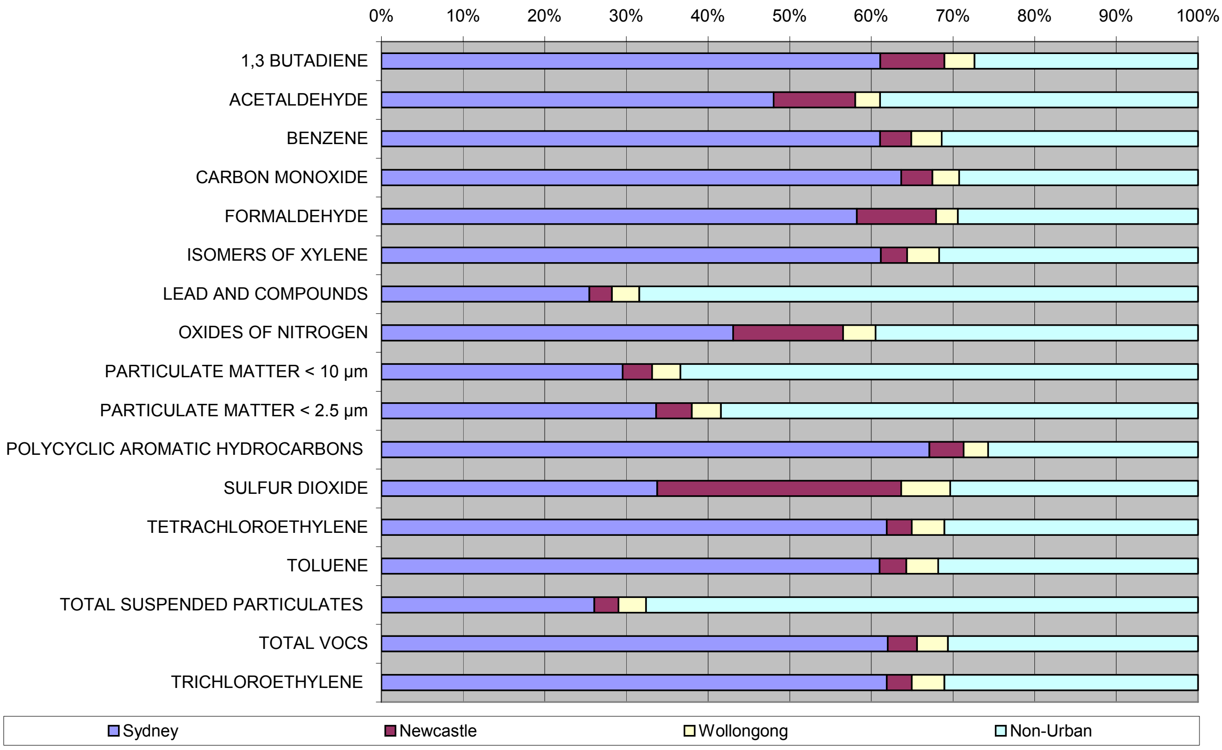

Figure 4.3: Proportion of total estimated daily emissions from off-road mobile sources in each region for typical January weekend day

Table 4.4: Total estimated daily emissions from off-road mobile sources in each region for typical July weekday

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	3.25×10^{-02}	7.64×10^{-03}	1.63×10^{-03}	1.32×10^{-02}	5.50×10^{-02}
ACETALDEHYDE	3.10×10^{-01}	5.97×10^{-02}	2.14×10^{-02}	3.18×10^{-01}	7.09×10^{-01}
BENZENE	1.06×10^{-01}	1.13×10^{-02}	4.94×10^{-03}	7.14×10^{-02}	1.94×10^{-01}
CARBON MONOXIDE	$4.16 \times 10^{+01}$	3.25	1.29	$2.03 \times 10^{+01}$	$6.64 \times 10^{+01}$
FORMALDEHYDE	3.11×10^{-01}	5.20×10^{-02}	1.45×10^{-02}	1.93×10^{-01}	5.70×10^{-01}
ISOMERS OF XYLENE	2.47×10^{-01}	2.25×10^{-02}	1.53×10^{-02}	2.30×10^{-01}	5.15×10^{-01}
LEAD AND COMPOUNDS	3.86×10^{-02}	4.17×10^{-03}	5.54×10^{-03}	1.12×10^{-01}	1.60×10^{-01}
OXIDES OF NITROGEN	$2.54 \times 10^{+01}$	7.56	2.42	$2.79 \times 10^{+01}$	$6.33 \times 10^{+01}$
PARTICULATE MATTER < 10 µm	$1.03 \times 10^{+01}$	1.30	1.46	$2.87 \times 10^{+01}$	$4.18 \times 10^{+01}$
PARTICULATE MATTER < 2.5 µm	4.71	6.83×10^{-01}	6.39×10^{-01}	$1.22 \times 10^{+01}$	$1.82 \times 10^{+01}$
POLYCYCLIC AROMATIC HYDROCARBONS	6.07×10^{-02}	4.55×10^{-03}	1.42×10^{-03}	1.95×10^{-02}	8.62×10^{-02}
SULFUR DIOXIDE	3.52	3.20	6.33×10^{-01}	3.29	$1.06 \times 10^{+01}$
TETRACHLOROETHYLENE	1.88×10^{-03}	1.44×10^{-04}	1.24×10^{-04}	1.70×10^{-03}	3.85×10^{-03}
TOLUENE	2.52×10^{-01}	2.24×10^{-02}	1.44×10^{-02}	2.16×10^{-01}	5.06×10^{-01}
TOTAL SUSPENDED PARTICULATES	$4.45 \times 10^{+01}$	5.06	6.49	$1.30 \times 10^{+02}$	$1.86 \times 10^{+02}$
TOTAL VOCS	8.16	5.90×10^{-01}	3.01×10^{-01}	3.98	$1.30 \times 10^{+01}$
TRICHLOROETHYLENE	1.15×10^{-03}	8.86×10^{-05}	7.60×10^{-05}	1.04×10^{-03}	2.36×10^{-03}

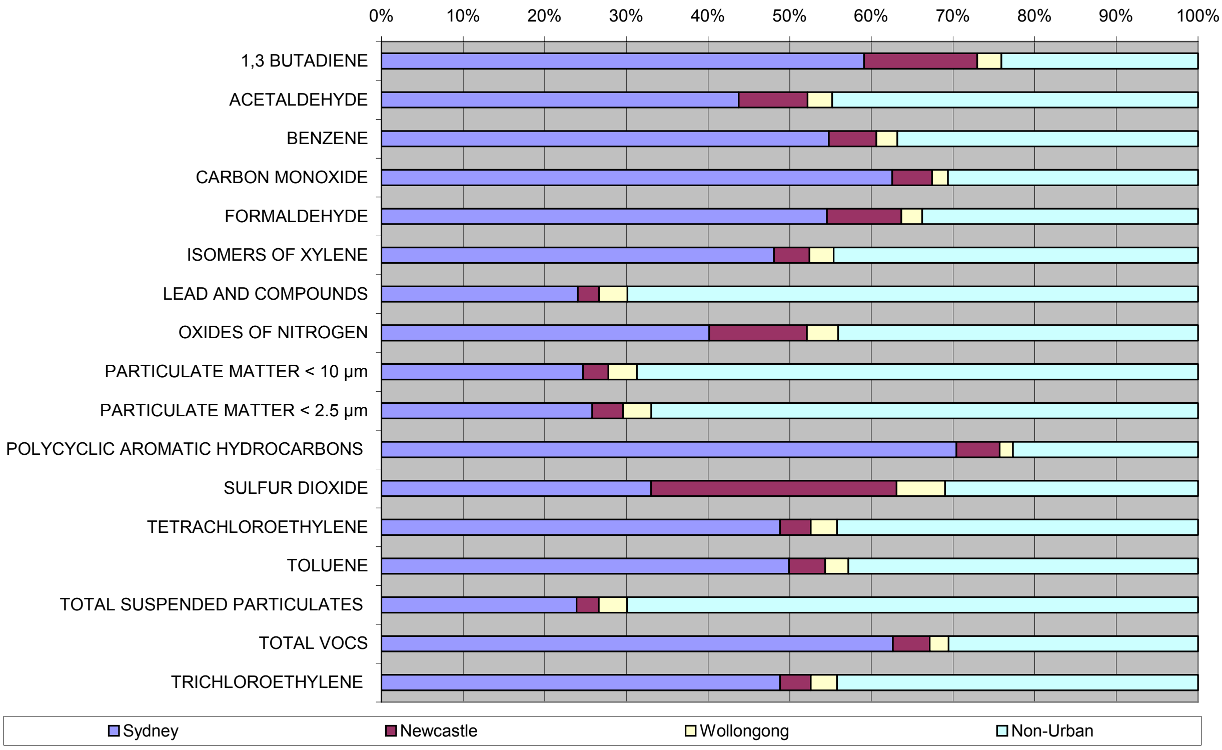

Figure 4.4: Proportion of total estimated daily emissions from off-road mobile sources in each region for typical July weekday

Table 4.5: Total estimated daily emissions from off-road mobile sources in each region for typical July weekend day

Substance	Emissions (tonnes/day)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR
1,3 BUTADIENE	4.74×10^{-02}	8.75×10^{-03}	2.68×10^{-03}	2.06×10^{-02}	7.94×10^{-02}
ACETALDEHYDE	2.96×10^{-01}	6.10×10^{-02}	1.97×10^{-02}	2.72×10^{-01}	6.49×10^{-01}
BENZENE	2.01×10^{-01}	1.62×10^{-02}	1.14×10^{-02}	1.15×10^{-01}	3.44×10^{-01}
CARBON MONOXIDE	$5.91 \times 10^{+01}$	4.11	2.44	$2.76 \times 10^{+01}$	$9.32 \times 10^{+01}$
FORMALDEHYDE	3.13×10^{-01}	5.39×10^{-02}	1.45×10^{-02}	1.76×10^{-01}	5.57×10^{-01}
ISOMERS OF XYLENE	8.22×10^{-01}	4.96×10^{-02}	5.26×10^{-02}	4.93×10^{-01}	1.42
LEAD AND COMPOUNDS	3.13×10^{-02}	3.40×10^{-03}	4.30×10^{-03}	8.75×10^{-02}	1.27×10^{-01}
OXIDES OF NITROGEN	$2.59 \times 10^{+01}$	8.03	2.45	$2.60 \times 10^{+01}$	$6.24 \times 10^{+01}$
PARTICULATE MATTER < 10 µm	9.01	1.15	1.18	$2.28 \times 10^{+01}$	$3.42 \times 10^{+01}$
PARTICULATE MATTER < 2.5 µm	4.42	6.41×10^{-01}	5.43×10^{-01}	9.91	$1.55 \times 10^{+01}$
POLYCYCLIC AROMATIC HYDROCARBONS	7.95×10^{-02}	5.59×10^{-03}	2.68×10^{-03}	2.75×10^{-02}	1.15×10^{-01}
SULFUR DIOXIDE	3.85	3.44	6.88×10^{-01}	3.54	$1.15 \times 10^{+01}$
TETRACHLOROETHYLENE	8.69×10^{-03}	4.64×10^{-04}	5.64×10^{-04}	4.86×10^{-03}	1.46×10^{-02}
TOLUENE	7.11×10^{-01}	4.45×10^{-02}	4.47×10^{-02}	4.30×10^{-01}	1.23
TOTAL SUSPENDED PARTICULATES	$3.67 \times 10^{+01}$	4.21	5.09	$1.02 \times 10^{+02}$	$1.48 \times 10^{+02}$
TOTAL VOCS	$1.34 \times 10^{+01}$	9.35×10^{-01}	7.43×10^{-01}	7.06	$2.22 \times 10^{+01}$
TRICHLOROETHYLENE	5.34×10^{-03}	2.85×10^{-04}	3.46×10^{-04}	2.99×10^{-03}	8.95×10^{-03}

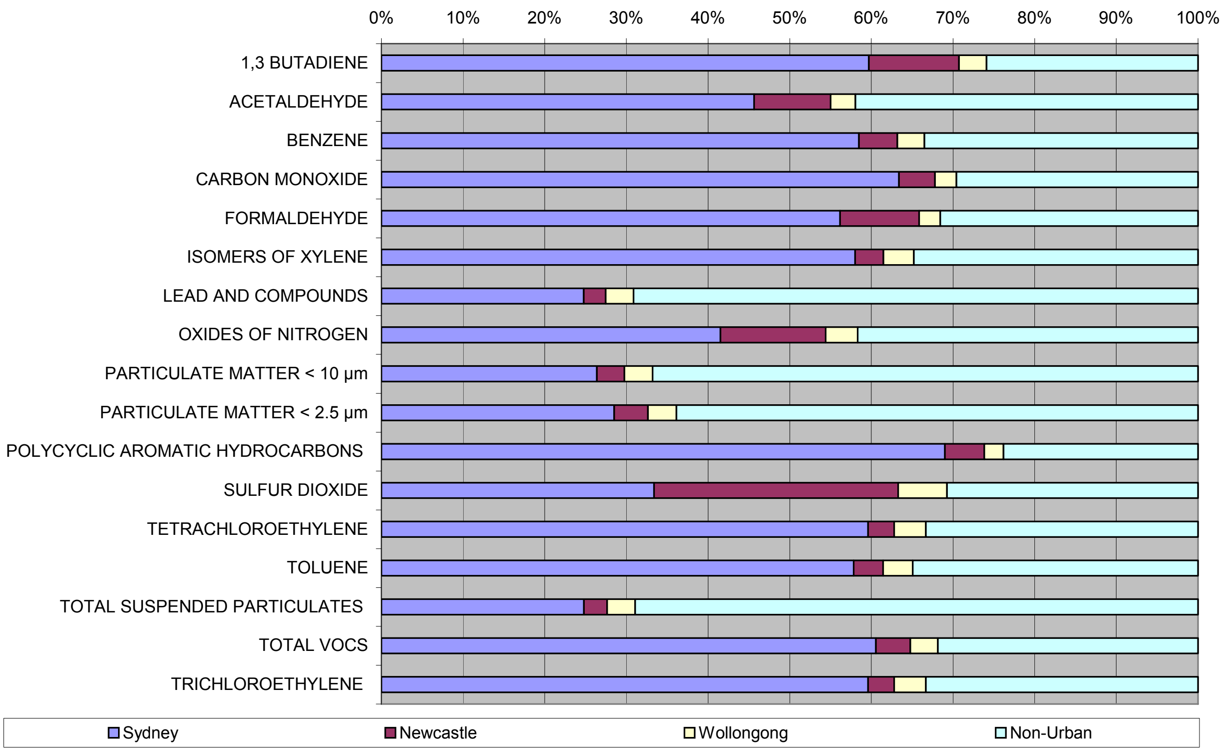

Figure 4.5: Proportion of total estimated daily emissions from off-road mobile sources in each region for typical July weekend day

Tables 4.6, 4.7, 4.8, 4.9 and 4.10 show total estimated annual emissions (for selected substances) from each off-road mobile source type in the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions respectively.

Figures 4.6, 4.7, 4.8, 4.9 and 4.10 show the proportion of total estimated annual emissions (for selected substances) from each off-road mobile source type in the GMR, Sydney, Newcastle, Wollongong and Non-Urban regions respectively.

Table 4.6: Total estimated annual emissions by off-road mobile source type in the GMR

Substance	Emissions (tonnes/year)									
	Aircraft	Commercial Boats	Commercial Off-road Vehicles and Equipment	Commercial Ships	Construction Off-Road Vehicles and Equipment	Industrial Off-Road Vehicles and Equipment	Loading and Unloading Fuels	Railways	Recreational Boats	Off-Road Mobile Total
1,3 BUTADIENE	8.29	2.23	2.86×10^{-01}	5.44	1.79×10^{-01}	7.57×10^{-01}	-	2.27	7.31	$2.68 \times 10^{+01}$
ACETALDEHYDE	$6.08 \times 10^{+01}$	$2.92 \times 10^{+01}$	$1.76 \times 10^{+01}$	$3.95 \times 10^{+01}$	3.81	$9.96 \times 10^{+01}$	-	4.28	1.99	$2.57 \times 10^{+02}$
BENZENE	$1.65 \times 10^{+01}$	$2.52 \times 10^{+01}$	1.99	3.86	1.72	6.59	3.12	2.49	$5.19 \times 10^{+01}$	$1.13 \times 10^{+02}$
CARBON MONOXIDE	$1.05 \times 10^{+04}$	$5.59 \times 10^{+03}$	$1.21 \times 10^{+03}$	$1.05 \times 10^{+03}$	$7.55 \times 10^{+02}$	$3.00 \times 10^{+03}$	-	$4.25 \times 10^{+02}$	$9.63 \times 10^{+03}$	$3.21 \times 10^{+04}$
FORMALDEHYDE	$8.21 \times 10^{+01}$	$1.72 \times 10^{+01}$	9.71	$3.01 \times 10^{+01}$	2.19	$5.34 \times 10^{+01}$	-	$1.26 \times 10^{+01}$	4.91	$2.12 \times 10^{+02}$
ISOMERS OF XYLENE	$1.37 \times 10^{+01}$	$1.01 \times 10^{+02}$	2.52	2.92	5.77	7.73	2.49	4.03×10^{-01}	$2.96 \times 10^{+02}$	$4.32 \times 10^{+02}$
LEAD AND COMPOUNDS	3.24×10^{-01}	3.26×10^{-03}	4.22	3.97×10^{-03}	2.37×10^{-03}	$5.04 \times 10^{+01}$	-	2.36×10^{-03}	1.70×10^{-04}	$5.49 \times 10^{+01}$
OXIDES OF NITROGEN	$3.27 \times 10^{+03}$	$2.48 \times 10^{+03}$	$1.01 \times 10^{+03}$	$6.18 \times 10^{+03}$	$2.18 \times 10^{+02}$	$6.80 \times 10^{+03}$	-	$3.35 \times 10^{+03}$	$1.72 \times 10^{+02}$	$2.35 \times 10^{+04}$
PARTICULATE MATTER < 10 µm	$9.25 \times 10^{+01}$	$1.67 \times 10^{+02}$	$1.16 \times 10^{+03}$	$2.13 \times 10^{+02}$	$1.71 \times 10^{+01}$	$1.26 \times 10^{+04}$	-	$9.98 \times 10^{+01}$	$2.33 \times 10^{+02}$	$1.46 \times 10^{+04}$
PARTICULATE MATTER < 2.5 µm	$8.58 \times 10^{+01}$	$1.55 \times 10^{+02}$	$5.28 \times 10^{+02}$	$2.04 \times 10^{+02}$	$1.65 \times 10^{+01}$	$5.19 \times 10^{+03}$	-	$9.01 \times 10^{+01}$	$2.14 \times 10^{+02}$	$6.49 \times 10^{+03}$
POLYCYCLIC AROMATIC HYDROCARBONS	$1.86 \times 10^{+01}$	3.28	7.17×10^{-01}	1.98	2.62×10^{-01}	3.64	-	1.47	$1.01 \times 10^{+01}$	$4.00 \times 10^{+01}$
SULFUR DIOXIDE	$2.40 \times 10^{+02}$	$5.98 \times 10^{+01}$	$3.16 \times 10^{+01}$	$3.15 \times 10^{+03}$	6.68	$1.95 \times 10^{+02}$	-	$4.68 \times 10^{+02}$	$2.14 \times 10^{+01}$	$4.17 \times 10^{+03}$
TETRACHLOROETHYLENE	3.12×10^{-02}	7.38×10^{-01}	1.20×10^{-02}	-	3.93×10^{-02}	9.11×10^{-04}	-	-	3.45	4.27
TOLUENE	$1.74 \times 10^{+01}$	$9.26 \times 10^{+01}$	2.92	3.44	5.40	9.80	7.60	2.52	$2.42 \times 10^{+02}$	$3.83 \times 10^{+02}$
TOTAL SUSPENDED PARTICULATES	$9.74 \times 10^{+01}$	$1.76 \times 10^{+02}$	$4.92 \times 10^{+03}$	$2.25 \times 10^{+02}$	$1.80 \times 10^{+01}$	$5.83 \times 10^{+04}$	-	$1.05 \times 10^{+02}$	$2.45 \times 10^{+02}$	$6.41 \times 10^{+04}$
TOTAL VOCS	$6.66 \times 10^{+02}$	$1.04 \times 10^{+03}$	$1.51 \times 10^{+02}$	$2.30 \times 10^{+02}$	$7.08 \times 10^{+01}$	$5.79 \times 10^{+02}$	$1.13 \times 10^{+03}$	$1.44 \times 10^{+02}$	$3.63 \times 10^{+03}$	$7.64 \times 10^{+03}$
TRICHLOROETHYLENE	1.92×10^{-02}	4.53×10^{-01}	7.37×10^{-03}	-	2.41×10^{-02}	5.59×10^{-04}	-	-	2.12	2.62

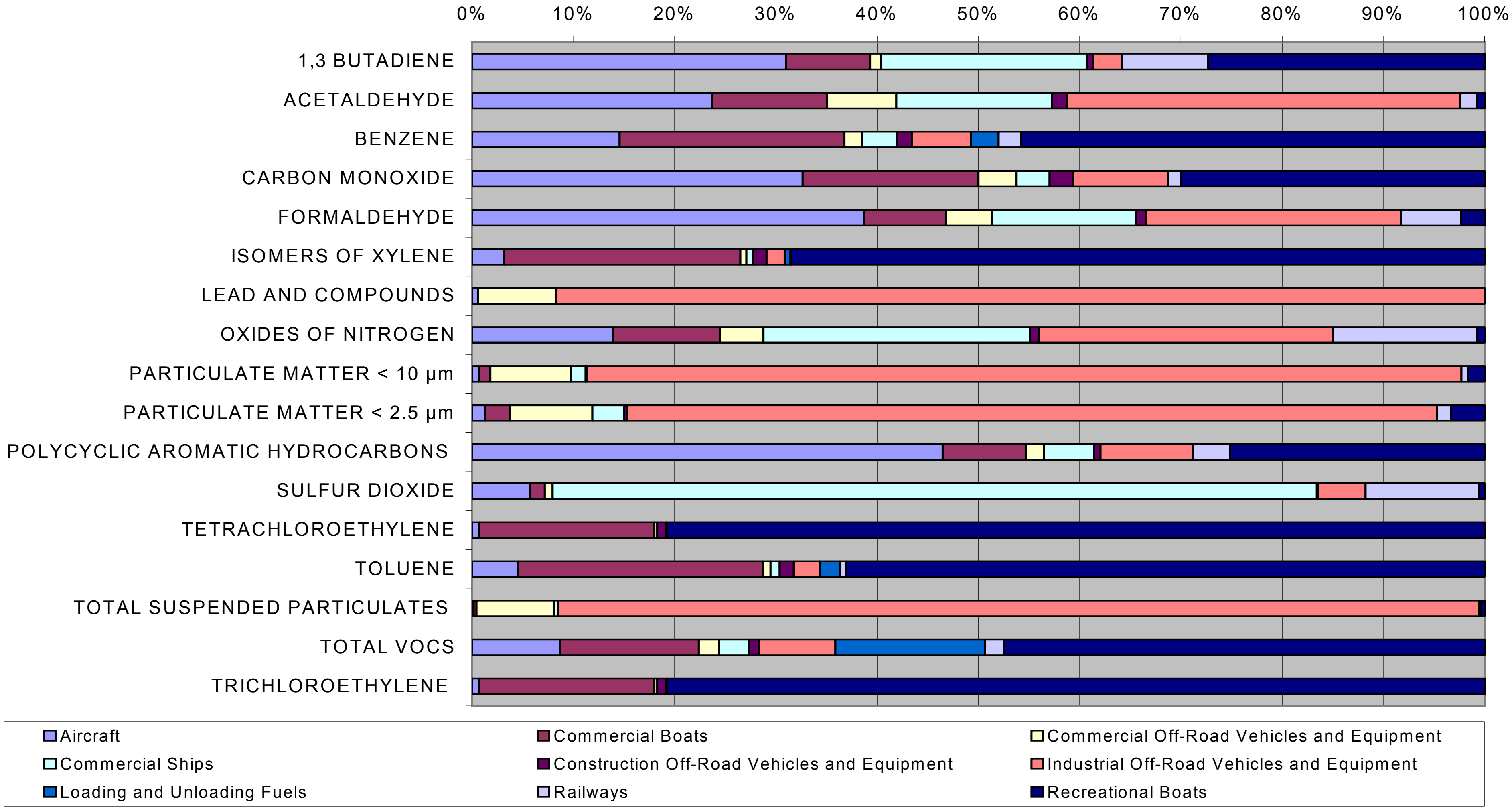

Figure 4.6: Proportion of total estimated annual emissions by off-road mobile source type in the GMR

Table 4.7: Total estimated annual emissions by off-road mobile source type in the Sydney region

Substance	Emissions (tonnes/year)									
	Aircraft	Commercial Boats	Commercial Off-Road Vehicles and Equipment	Commercial Ships	Construction Off-Road Vehicles and Equipment	Industrial Off-Road Vehicles and Equipment	Loading and Unloading Fuels	Railways	Recreational Boats	Off-Road Mobile Total
1,3 BUTADIENE	7.63	7.67×10^{-01}	1.25×10^{-01}	1.41	1.40×10^{-01}	1.68×10^{-01}	-	1.09	4.62	$1.60 \times 10^{+01}$
ACETALDEHYDE	$5.76 \times 10^{+01}$	$1.01 \times 10^{+01}$	7.67	$1.03 \times 10^{+01}$	2.98	$2.21 \times 10^{+01}$	-	2.05	1.25	$1.14 \times 10^{+02}$
BENZENE	$1.53 \times 10^{+01}$	8.66	8.68×10^{-01}	1.00	1.34	1.46	3.07	1.20	$3.28 \times 10^{+01}$	$6.57 \times 10^{+01}$
CARBON MONOXIDE	$9.98 \times 10^{+03}$	$1.92 \times 10^{+03}$	$5.26 \times 10^{+02}$	$2.72 \times 10^{+02}$	$5.91 \times 10^{+02}$	$6.66 \times 10^{+02}$	-	$2.04 \times 10^{+02}$	$6.09 \times 10^{+03}$	$2.03 \times 10^{+04}$
FORMALDEHYDE	$7.62 \times 10^{+01}$	5.92	4.23	7.82	1.72	$1.18 \times 10^{+01}$	-	6.07	3.11	$1.17 \times 10^{+02}$
ISOMERS OF XYLENE	$1.28 \times 10^{+01}$	$3.47 \times 10^{+01}$	1.10	7.59×10^{-01}	4.52	1.72	2.45	1.93×10^{-01}	$1.87 \times 10^{+02}$	$2.45 \times 10^{+02}$
LEAD AND COMPOUNDS	3.01×10^{-01}	1.12×10^{-03}	1.84	1.03×10^{-03}	1.86×10^{-03}	$1.12 \times 10^{+01}$	-	1.13×10^{-03}	1.07×10^{-04}	$1.33 \times 10^{+01}$
OXIDES OF NITROGEN	$3.22 \times 10^{+03}$	$8.53 \times 10^{+02}$	$4.40 \times 10^{+02}$	$1.61 \times 10^{+03}$	$1.71 \times 10^{+02}$	$1.51 \times 10^{+03}$	-	$1.61 \times 10^{+03}$	$1.09 \times 10^{+02}$	$9.51 \times 10^{+03}$
PARTICULATE MATTER < 10 µm	$8.62 \times 10^{+01}$	$5.76 \times 10^{+01}$	$5.05 \times 10^{+02}$	$5.55 \times 10^{+01}$	$1.34 \times 10^{+01}$	$2.79 \times 10^{+03}$	-	$4.79 \times 10^{+01}$	$1.47 \times 10^{+02}$	$3.71 \times 10^{+03}$
PARTICULATE MATTER < 2.5 µm	$8.00 \times 10^{+01}$	$5.34 \times 10^{+01}$	$2.30 \times 10^{+02}$	$5.31 \times 10^{+01}$	$1.29 \times 10^{+01}$	$1.15 \times 10^{+03}$	-	$4.33 \times 10^{+01}$	$1.35 \times 10^{+02}$	$1.76 \times 10^{+03}$
POLYCYCLIC AROMATIC HYDROCARBONS	$1.76 \times 10^{+01}$	1.13	3.12×10^{-01}	5.15×10^{-01}	2.05×10^{-01}	8.08×10^{-01}	-	7.08×10^{-01}	6.35	$2.76 \times 10^{+01}$
SULFUR DIOXIDE	$2.35 \times 10^{+02}$	$2.06 \times 10^{+01}$	$1.38 \times 10^{+01}$	$8.18 \times 10^{+02}$	5.23	$4.32 \times 10^{+01}$	-	$2.25 \times 10^{+02}$	$1.35 \times 10^{+01}$	$1.37 \times 10^{+03}$
TETRACHLOROETHYLENE	2.99×10^{-02}	2.54×10^{-01}	5.23×10^{-03}	-	3.07×10^{-02}	2.02×10^{-04}	-	-	2.18	2.50
TOLUENE	$1.62 \times 10^{+01}$	$3.19 \times 10^{+01}$	1.28	8.95×10^{-01}	4.23	2.18	7.47	1.21	$1.53 \times 10^{+02}$	$2.18 \times 10^{+02}$
TOTAL SUSPENDED PARTICULATES	$9.08 \times 10^{+01}$	$6.06 \times 10^{+01}$	$2.14 \times 10^{+03}$	$5.84 \times 10^{+01}$	$1.41 \times 10^{+01}$	$1.29 \times 10^{+04}$	-	$5.04 \times 10^{+01}$	$1.55 \times 10^{+02}$	$1.55 \times 10^{+04}$
TOTAL VOCS	$6.21 \times 10^{+02}$	$3.59 \times 10^{+02}$	$6.59 \times 10^{+01}$	$5.98 \times 10^{+01}$	$5.54 \times 10^{+01}$	$1.28 \times 10^{+02}$	$1.12 \times 10^{+03}$	$6.91 \times 10^{+01}$	$2.29 \times 10^{+03}$	$4.77 \times 10^{+03}$
TRICHLOROETHYLENE	1.84×10^{-02}	1.56×10^{-01}	3.21×10^{-03}	-	1.89×10^{-02}	1.24×10^{-04}	-	-	1.34	1.54

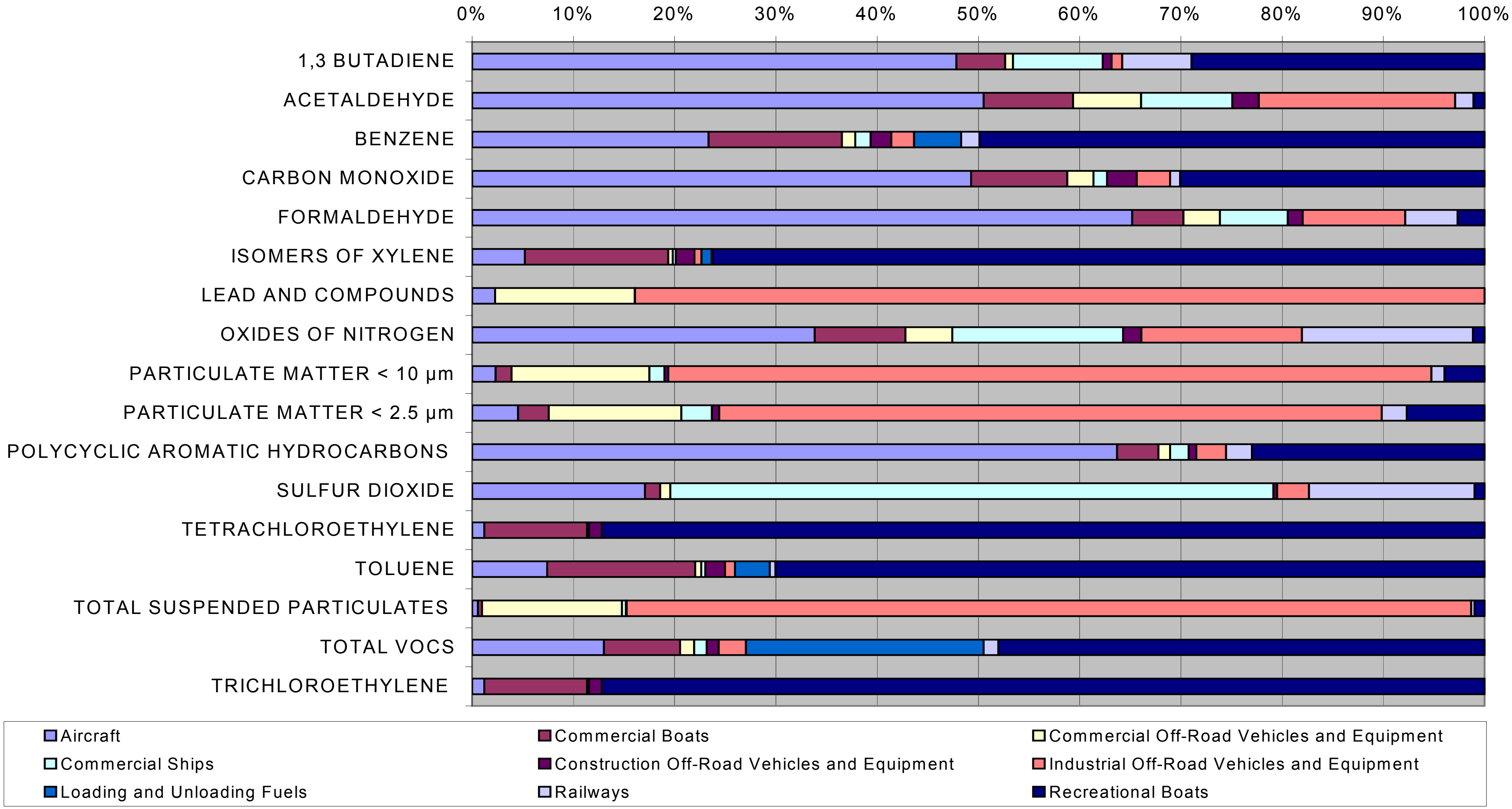

Figure 4.7: Proportion of total estimated annual emissions by off-road mobile source type in the Sydney region

Table 4.8: Total estimated annual emissions by off-road mobile source type in the Newcastle region

Substance	Emissions (tonnes/year)									
	Aircraft	Commercial Boats	Commercial Off-Road Vehicles and Equipment	Commercial Ships	Construction Off-Road Vehicles and Equipment	Industrial Off-Road Vehicles and Equipment	Loading and Unloading Fuels	Railways	Recreational Boats	Off-Road Mobile Total
1,3 BUTADIENE	5.55×10^{-01}	9.37×10^{-02}	1.49×10^{-02}	2.12	1.04×10^{-02}	1.82×10^{-02}	-	1.14×10^{-01}	2.20×10^{-01}	3.15
ACETALDEHYDE	2.46	1.23	9.15×10^{-01}	$1.54 \times 10^{+01}$	2.21×10^{-01}	2.39	-	2.14×10^{-01}	5.97×10^{-02}	$2.29 \times 10^{+01}$
BENZENE	9.13×10^{-01}	1.06	1.04×10^{-01}	1.50	9.95×10^{-02}	1.58×10^{-01}	-	1.25×10^{-01}	1.56	5.52
CARBON MONOXIDE	$3.18 \times 10^{+02}$	$2.35 \times 10^{+02}$	$6.27 \times 10^{+01}$	$4.08 \times 10^{+02}$	$4.38 \times 10^{+01}$	$7.20 \times 10^{+01}$	-	$2.13 \times 10^{+01}$	$2.90 \times 10^{+02}$	$1.45 \times 10^{+03}$
FORMALDEHYDE	4.86	7.24×10^{-01}	5.05×10^{-01}	$1.17 \times 10^{+01}$	1.27×10^{-01}	1.28	-	6.32×10^{-01}	1.48×10^{-01}	$2.00 \times 10^{+01}$
ISOMERS OF XYLENE	6.53×10^{-01}	4.25	1.31×10^{-01}	1.14	3.34×10^{-01}	1.85×10^{-01}	-	2.02×10^{-02}	8.91	$1.56 \times 10^{+01}$
LEAD AND COMPOUNDS	1.12×10^{-02}	1.37×10^{-04}	2.19×10^{-01}	1.55×10^{-03}	1.38×10^{-04}	1.21	-	1.18×10^{-04}	5.12×10^{-06}	1.44
OXIDES OF NITROGEN	$3.62 \times 10^{+01}$	$1.04 \times 10^{+02}$	$5.24 \times 10^{+01}$	$2.41 \times 10^{+03}$	$1.27 \times 10^{+01}$	$1.63 \times 10^{+02}$	-	$1.68 \times 10^{+02}$	5.17	$2.95 \times 10^{+03}$
PARTICULATE MATTER < 10 µm	2.98	7.04	$6.02 \times 10^{+01}$	$8.32 \times 10^{+01}$	9.91×10^{-01}	$3.02 \times 10^{+02}$	-	4.99	7.00	$4.69 \times 10^{+02}$
PARTICULATE MATTER < 2.5 µm	2.76	6.53	$2.75 \times 10^{+01}$	$7.96 \times 10^{+01}$	9.54×10^{-01}	$1.25 \times 10^{+02}$	-	4.51	6.45	$2.53 \times 10^{+02}$
POLYCYCLIC AROMATIC HYDROCARBONS	5.49×10^{-01}	1.38×10^{-01}	3.73×10^{-02}	7.72×10^{-01}	1.52×10^{-02}	8.74×10^{-02}	-	7.37×10^{-02}	3.03×10^{-01}	1.97
SULFUR DIOXIDE	3.64	2.51	1.64	$1.23 \times 10^{+03}$	3.87×10^{-01}	4.67	-	$2.34 \times 10^{+01}$	6.45×10^{-01}	$1.26 \times 10^{+03}$
TETRACHLOROETHYLENE	8.51×10^{-04}	3.10×10^{-02}	6.24×10^{-04}	-	2.28×10^{-03}	2.19×10^{-05}	-	-	1.04×10^{-01}	1.39×10^{-01}
TOLUENE	9.19×10^{-01}	3.90	1.52×10^{-01}	1.34	3.13×10^{-01}	2.35×10^{-01}	-	1.26×10^{-01}	7.27	$1.43 \times 10^{+01}$
TOTAL SUSPENDED PARTICULATES	3.14	7.41	$2.56 \times 10^{+02}$	$8.76 \times 10^{+01}$	1.04	$1.40 \times 10^{+03}$	-	5.25	7.37	$1.77 \times 10^{+03}$
TOTAL VOCS	$3.65 \times 10^{+01}$	$4.39 \times 10^{+01}$	7.86	$8.97 \times 10^{+01}$	4.10	$1.39 \times 10^{+01}$	-	7.20	$1.09 \times 10^{+02}$	$3.12 \times 10^{+02}$
TRICHLOROETHYLENE	5.23×10^{-04}	1.91×10^{-02}	3.83×10^{-04}	-	1.40×10^{-03}	1.34×10^{-05}	-	-	6.38×10^{-02}	8.51×10^{-02}

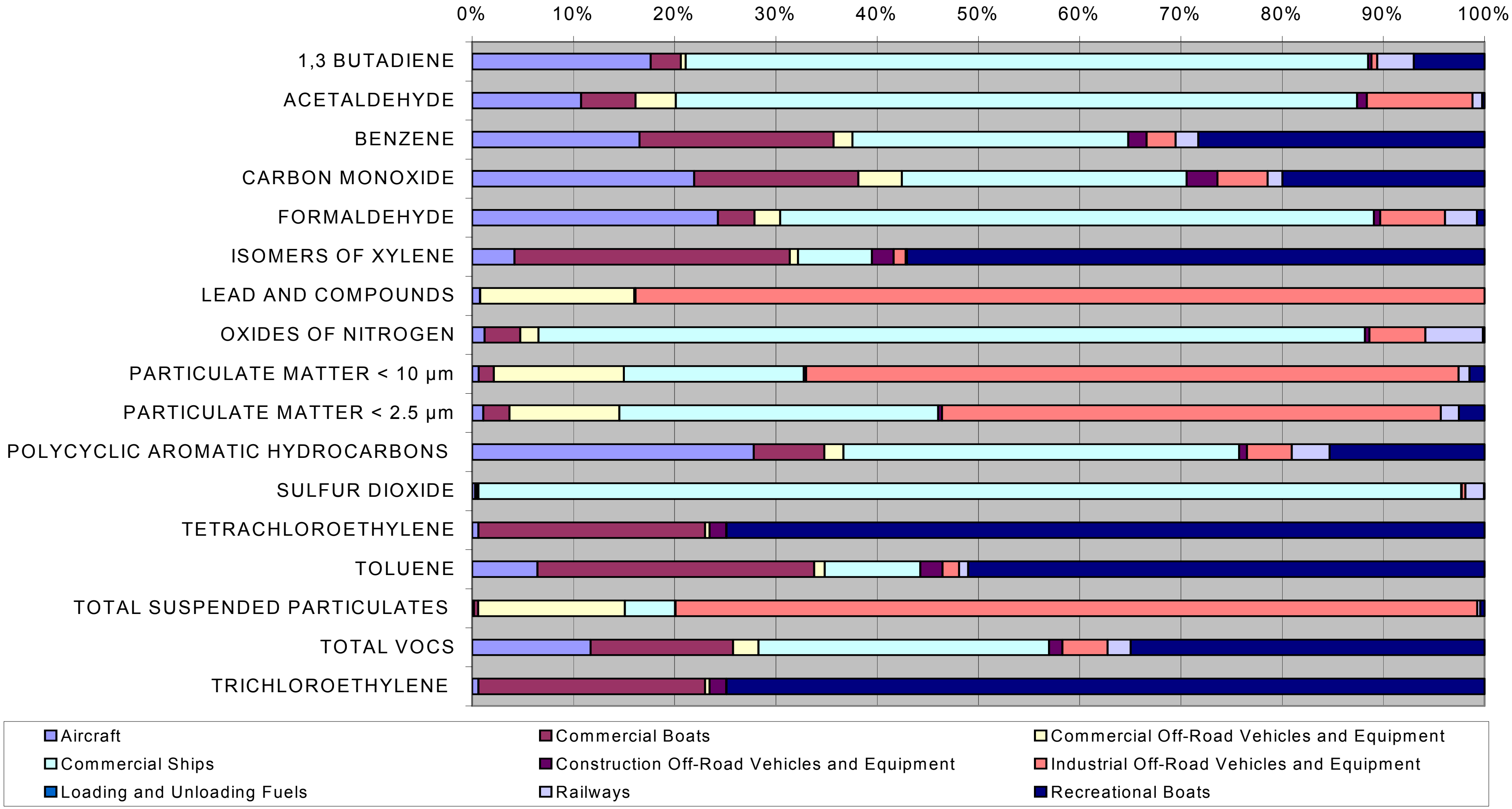

Figure 4.8: Proportion of total estimated annual emissions by off-road mobile source type in the Newcastle region

Table 4.9: Total estimated annual emissions by off-road mobile source type in the Wollongong region

Substance	Emissions (tonnes/year)									
	Aircraft	Commercial Boats	Commercial Off-Road Vehicles and Equipment	Commercial Ships	Construction Off-Road Vehicles and Equipment	Industrial Off-Road Vehicles and Equipment	Loading and Unloading Fuels	Railways	Recreational Boats	Off-Road Mobile Total
1,3 BUTADIENE	6.82×10^{-03}	6.20×10^{-02}	5.15×10^{-03}	3.80×10^{-01}	3.77×10^{-03}	2.72×10^{-02}	-	9.32×10^{-02}	2.98×10^{-01}	8.77×10^{-01}
ACETALDEHYDE	1.54×10^{-02}	8.14×10^{-01}	3.17×10^{-01}	2.77	8.00×10^{-02}	3.59	-	1.75×10^{-01}	8.09×10^{-02}	7.83
BENZENE	1.18×10^{-02}	7.01×10^{-01}	3.58×10^{-02}	2.70×10^{-01}	3.60×10^{-02}	2.37×10^{-01}	5.15×10^{-02}	1.02×10^{-01}	2.12	3.56
CARBON MONOXIDE	7.77	$1.56 \times 10^{+02}$	$2.17 \times 10^{+01}$	$7.33 \times 10^{+01}$	$1.59 \times 10^{+01}$	$1.08 \times 10^{+02}$	-	$1.74 \times 10^{+01}$	$3.93 \times 10^{+02}$	$7.93 \times 10^{+02}$
FORMALDEHYDE	4.91×10^{-02}	4.79×10^{-01}	1.75×10^{-01}	2.11	4.60×10^{-02}	1.92	-	5.18×10^{-01}	2.00×10^{-01}	5.49
ISOMERS OF XYLENE	1.01×10^{-02}	2.81	4.53×10^{-02}	2.04×10^{-01}	1.21×10^{-01}	2.78×10^{-01}	3.70×10^{-02}	1.65×10^{-02}	$1.21 \times 10^{+01}$	$1.56 \times 10^{+01}$
LEAD AND COMPOUNDS	3.63×10^{-04}	9.07×10^{-05}	7.59×10^{-02}	2.78×10^{-04}	4.98×10^{-05}	1.81	-	9.69×10^{-05}	6.94×10^{-06}	1.89
OXIDES OF NITROGEN	5.62×10^{-01}	$6.90 \times 10^{+01}$	$1.81 \times 10^{+01}$	$4.32 \times 10^{+02}$	4.59	$2.45 \times 10^{+02}$	-	$1.37 \times 10^{+02}$	7.00	$9.14 \times 10^{+02}$
PARTICULATE MATTER < 10 µm	1.51×10^{-01}	4.66	$2.09 \times 10^{+01}$	$1.49 \times 10^{+01}$	3.59×10^{-01}	$4.53 \times 10^{+02}$	-	4.09	9.49	$5.08 \times 10^{+02}$
PARTICULATE MATTER < 2.5 µm	1.39×10^{-01}	4.33	9.51	$1.43 \times 10^{+01}$	3.46×10^{-01}	$1.87 \times 10^{+02}$	-	3.70	8.73	$2.28 \times 10^{+02}$
POLYCYCLIC AROMATIC HYDROCARBONS	1.56×10^{-02}	9.13×10^{-02}	1.29×10^{-02}	1.39×10^{-01}	5.51×10^{-03}	1.31×10^{-01}	-	6.04×10^{-02}	4.10×10^{-01}	8.65×10^{-01}
SULFUR DIOXIDE	4.37×10^{-02}	1.66	5.69×10^{-01}	$2.20 \times 10^{+02}$	1.40×10^{-01}	7.01	-	$1.92 \times 10^{+01}$	8.73×10^{-01}	$2.50 \times 10^{+02}$
TETRACHLOROETHYLENE	4.14×10^{-07}	2.05×10^{-02}	2.16×10^{-04}	-	8.24×10^{-04}	3.28×10^{-05}	-	-	1.41×10^{-01}	1.62×10^{-01}
TOLUENE	1.69×10^{-02}	2.58	5.26×10^{-02}	2.41×10^{-01}	1.13×10^{-01}	3.53×10^{-01}	1.24×10^{-01}	1.03×10^{-01}	9.85	$1.34 \times 10^{+01}$
TOTAL SUSPENDED PARTICULATES	1.58×10^{-01}	4.91	$8.86 \times 10^{+01}$	$1.57 \times 10^{+01}$	3.78×10^{-01}	$2.10 \times 10^{+03}$	-	4.31	9.99	$2.22 \times 10^{+03}$
TOTAL VOCS	4.08×10^{-01}	$2.91 \times 10^{+01}$	2.72	$1.61 \times 10^{+01}$	1.49	$2.08 \times 10^{+01}$	7.71	5.90	$1.48 \times 10^{+02}$	$2.32 \times 10^{+02}$
TRICHLOROETHYLENE	2.54×10^{-07}	1.26×10^{-02}	1.33×10^{-04}	-	5.06×10^{-04}	2.01×10^{-05}	-	-	8.64×10^{-02}	9.97×10^{-02}

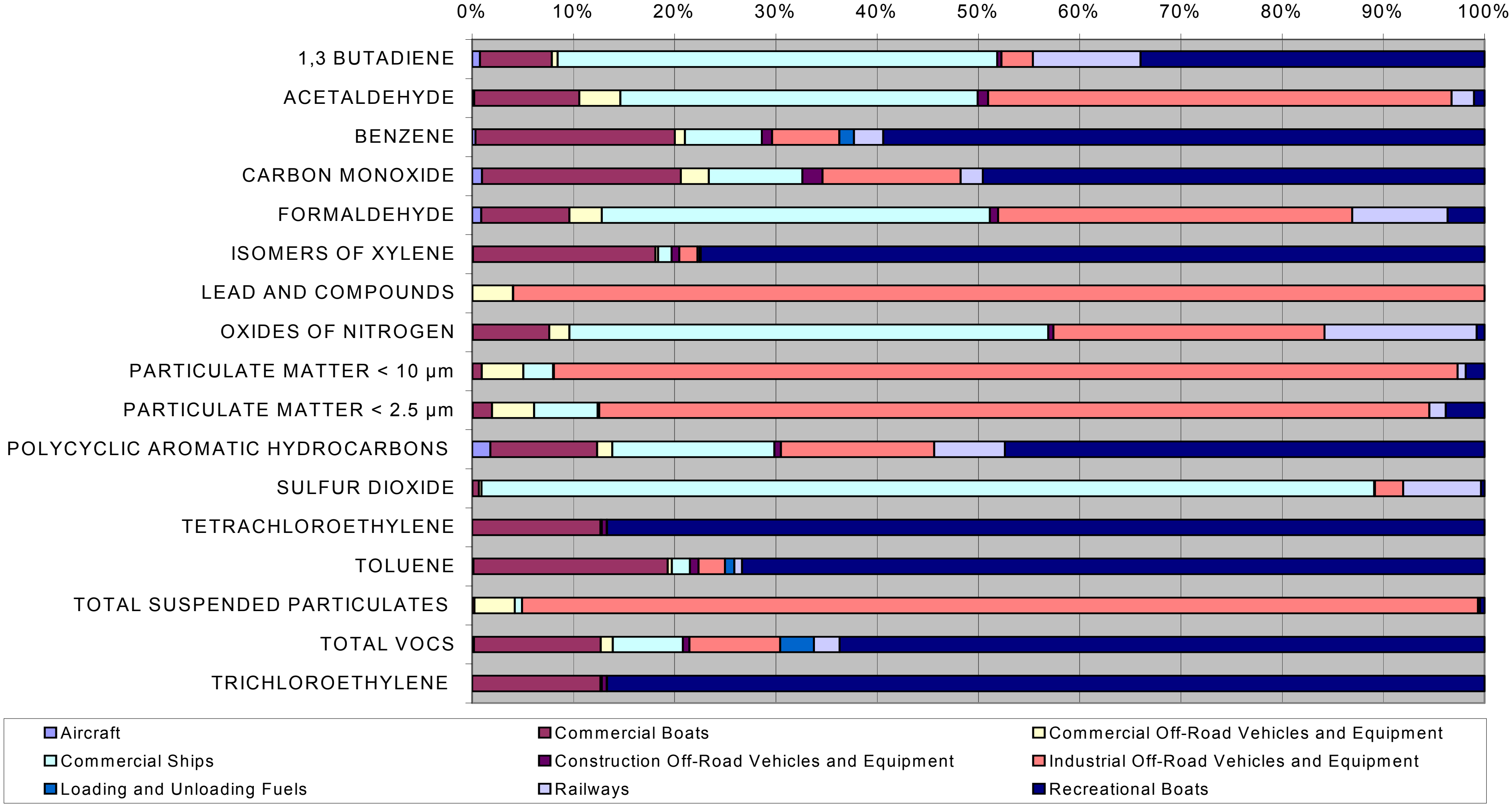

Figure 4.9: Proportion of total estimated annual emissions by off-road mobile source type in the Wollongong region

Table 4.10: Total estimated annual emissions by off-road mobile source type in the Non-Urban region

Substance	Emissions (tonnes/year)									
	Aircraft	Commercial Boats	Commercial Off-Road Vehicles and Equipment	Commercial Ships	Construction Off-Road Vehicles and Equipment	Industrial Off-Road Vehicles and Equipment	Loading and Unloading Fuels	Railways	Recreational Boats	Off-Road Mobile Total
1,3 BUTADIENE	9.72×10^{-02}	1.30	1.41×10^{-01}	1.52	2.47×10^{-02}	5.43×10^{-01}	-	9.75×10^{-01}	2.17	6.78
ACETALDEHYDE	7.52×10^{-01}	$1.71 \times 10^{+01}$	8.69	$1.11 \times 10^{+01}$	5.26×10^{-01}	$7.15 \times 10^{+01}$	-	1.84	5.90×10^{-01}	$1.12 \times 10^{+02}$
BENZENE	2.30×10^{-01}	$1.47 \times 10^{+01}$	9.84×10^{-01}	1.08	2.37×10^{-01}	4.73	-	1.07	$1.54 \times 10^{+01}$	$3.85 \times 10^{+01}$
CARBON MONOXIDE	$1.84 \times 10^{+02}$	$3.27 \times 10^{+03}$	$5.96 \times 10^{+02}$	$2.93 \times 10^{+02}$	$1.04 \times 10^{+02}$	$2.15 \times 10^{+03}$	-	$1.82 \times 10^{+02}$	$2.86 \times 10^{+03}$	$9.65 \times 10^{+03}$
FORMALDEHYDE	9.31×10^{-01}	$1.01 \times 10^{+01}$	4.80	8.42	3.02×10^{-01}	$3.83 \times 10^{+01}$	-	5.42	1.46	$6.97 \times 10^{+01}$
ISOMERS OF XYLENE	2.25×10^{-01}	$5.91 \times 10^{+01}$	1.24	8.17×10^{-01}	7.96×10^{-01}	5.55	-	1.73×10^{-01}	$8.80 \times 10^{+01}$	$1.56 \times 10^{+02}$
LEAD AND COMPOUNDS	1.20×10^{-02}	1.91×10^{-03}	2.08	1.11×10^{-03}	3.27×10^{-04}	$3.62 \times 10^{+01}$	-	1.01×10^{-03}	5.05×10^{-05}	$3.83 \times 10^{+01}$
OXIDES OF NITROGEN	$1.23 \times 10^{+01}$	$1.45 \times 10^{+03}$	$4.98 \times 10^{+02}$	$1.73 \times 10^{+03}$	$3.01 \times 10^{+01}$	$4.88 \times 10^{+03}$	-	$1.44 \times 10^{+03}$	$5.10 \times 10^{+01}$	$1.01 \times 10^{+04}$
PARTICULATE MATTER < 10 µm	3.13	$9.80 \times 10^{+01}$	$5.72 \times 10^{+02}$	$5.98 \times 10^{+01}$	2.36	$9.04 \times 10^{+03}$	-	$4.28 \times 10^{+01}$	$6.91 \times 10^{+01}$	$9.88 \times 10^{+03}$
PARTICULATE MATTER < 2.5 µm	2.89	$9.10 \times 10^{+01}$	$2.61 \times 10^{+02}$	$5.72 \times 10^{+01}$	2.27	$3.73 \times 10^{+03}$	-	$3.87 \times 10^{+01}$	$6.36 \times 10^{+01}$	$4.24 \times 10^{+03}$
POLYCYCLIC AROMATIC HYDROCARBONS	4.06×10^{-01}	1.92	3.54×10^{-01}	5.54×10^{-01}	3.62×10^{-02}	2.61	-	6.32×10^{-01}	2.99	9.50
SULFUR DIOXIDE	1.22	$3.50 \times 10^{+01}$	$1.56 \times 10^{+01}$	$8.81 \times 10^{+02}$	9.22×10^{-01}	$1.40 \times 10^{+02}$	-	$2.01 \times 10^{+02}$	6.36	$1.28 \times 10^{+03}$
TETRACHLOROETHYLENE	4.10×10^{-04}	4.32×10^{-01}	5.93×10^{-03}	-	5.42×10^{-03}	6.54×10^{-04}	-	-	1.02	1.47
TOLUENE	3.13×10^{-01}	$5.43 \times 10^{+01}$	1.44	9.64×10^{-01}	7.45×10^{-01}	7.04	-	1.08	$7.18 \times 10^{+01}$	$1.38 \times 10^{+02}$
TOTAL SUSPENDED PARTICULATES	3.29	$1.03 \times 10^{+02}$	$2.43 \times 10^{+03}$	$6.29 \times 10^{+01}$	2.48	$4.19 \times 10^{+04}$	-	$4.51 \times 10^{+01}$	$7.28 \times 10^{+01}$	$4.46 \times 10^{+04}$
TOTAL VOCS	8.52	$6.12 \times 10^{+02}$	$7.46 \times 10^{+01}$	$6.44 \times 10^{+01}$	9.77	$4.15 \times 10^{+02}$	-	$6.18 \times 10^{+01}$	$1.08 \times 10^{+03}$	$2.32 \times 10^{+03}$
TRICHLOROETHYLENE	2.52×10^{-04}	2.65×10^{-01}	3.64×10^{-03}	-	3.33×10^{-03}	4.02×10^{-04}	-	-	6.29×10^{-01}	9.03×10^{-01}

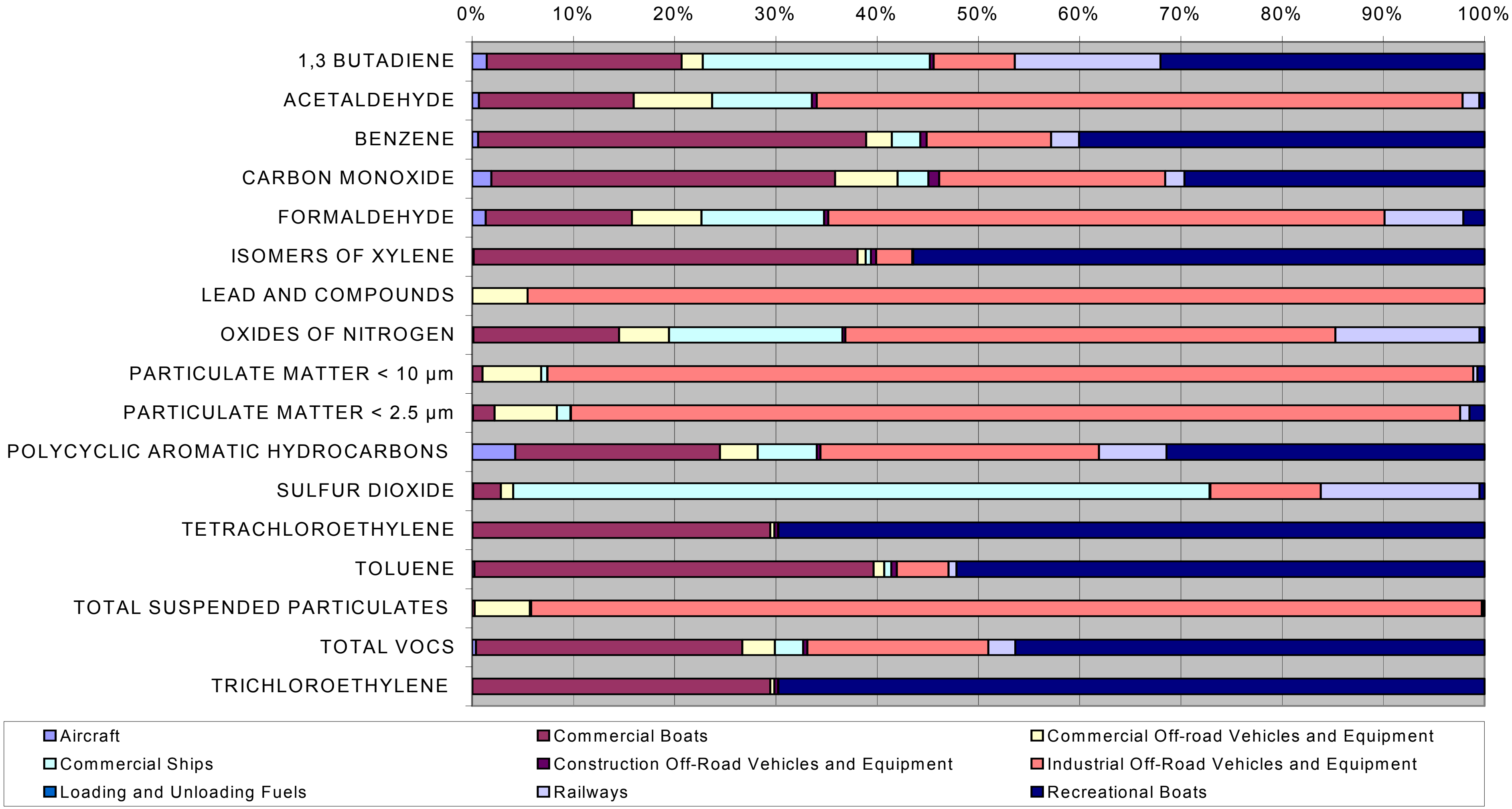

Figure 4.10: Proportion of total estimated annual emissions by off-road mobile source type in the Non-Urban region

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Appendix A: Industrial and Commercial Survey Questionnaire Form

Hard-Rock Gravel Quarrying Questionnaire

Please indicate as much of the following information as possible. If information is unavailable or is difficult to obtain, please provide a best estimate. Please indicate where a question is not applicable (e.g. “NA”) or where no data are available (e.g. “ND”).

Pacific Air & Environment (PAE) acknowledges that the information may be commercially sensitive. All information presented in this survey will be kept strictly confidential.

Q1. Facility name: <<Facility>>

Q2. Facility street address <<Premises Street>>
<<Premises Suburb>>
<<Premises State>>

Q3. Facility main activity: <<Activity>>

Q4. Facility primary ANZSIC code (*Please indicate if incorrect)* <<ANZSIC>>

Q5. Does the facility perform any other activity other than described in Question 4 (provide ANZSIC Code if known)?: ______________________________

Q6. Person completing questionnaire: ______________________________

Q7. Contact Details
Phone number: ______________________________
Fax number: ______________________________
Email: ______________________________

Operating Schedule (*cross out when not operating*)

Q8. Months of the Year: JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

Q9. Days of the Week: MON TUES WED THUR FRI SAT SUN

Q10. Weekday Hours of the Day:
1 2 3 4 5 6 7 8 9 10 11 12 (noon) 1 2 3 4 5 6 7 8 9 10 11 12 (midnight)

Weekend Hours of the Day:
1 2 3 4 5 6 7 8 9 10 11 12 (noon) 1 2 3 4 5 6 7 8 9 10 11 12 (midnight)

Q11. Seasonal Variation

If activity varies for any reason please indicate the **approximate** variation as a percentage of a full year.

e.g.: JAN – MAR 30%, APR – JUNE 20%, JULY – SEP 10%, OCT – DEC 40%

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

Q12. Are there any additional variations in production not addressed by Q8-Q11 above.

____

____

On-Site Vehicles

Q30. Please specify the following information pertaining to vehicles used for ON-SITE operations as best as possible (please read the footnotes beneath the table).

Type of vehicle [a]	Vehicle model year	Number of vehicles of this type operating	Fuel type (Petrol, diesel, LPG)	Engine Size (or power rating – kW or HP)	ON-SITE operating regime (e.g. 6am – 6pm, Monday to Friday)[b]	Typical operating hours per day	Number of operating days per year	Annual ON-SITE VKT per vehicle (km) [c, d]	% of VKT on PAVED roads (%) [c, d]	% of VKT on UNPAVED roads (%) [c,d]

a Covers Off-Road vehicles only. Off-Road vehicles typically are not registered with the Road and Traffic Authority (RTA) because they do not access the road network. Some may have Conditional Registrations with the RTA, when it requires limited access to the road network. Example: front end loader, grader, bulldozer, fork lifts.
b Please characterise the ON-SITE operating regime if it differs to that described in Q8 – Q12.
c It is important to ensure that only ON-SITE operations are considered when providing these data.
d VKT = Vehicle Kilometres Travelled (km). Provide these data on a 'per vehicle' basis (i.e. so the TOTAL VKTs for a particular vehicle type will be the 'number of vehicles' by the 'VKTs' for each vehicle). This data only needs to be approximate.

Q31. Please specify the total fuel consumed by on-site vehicles:

Petrol:_______________________ kL/year

Diesel:_______________________ kL/year

LPG:_______________________m^3/year

Appendix B: Domestic Survey Questionnaire Form

Why a Domestic Survey
The domestic survey is the most accurate way to obtain information on activities affecting air emissions carried out by people at home.

What's covered in the survey
This survey will cover the usage of garden equipment, watercraft, and domestic fuel burning.

Confidentiality
The study team will not release any information you provide in a way which would enable an individual's or household's data to be identified.

Help Available
If you need help completing this form, you can contact the project team via email at AEI_Project_O2@environment.nsw.gov.au or by telephone on (02) 92125983.

9 3 46 04 7 3 43 955

Rec No (D - C)

☐☐☐☐☐☐☐

NSW Department of Environment and Conservation

Air Emission Inventory For The Greater Metropolitan Region In NSW
Domestic Survey

The NSW Department of Environment and Conservation (DEC) seeks to collect some information from your household anonymously to assist us in developing means to improve the air quality in the NSW Greater Metropolitan Region. The focus of this survey is to establish the usage pattern for garden equipment, watercraft, and domestic fuel burning.

Telephone number listings have been used to generate a list of survey subjects at random in the Sydney, Newcastle and Wollongong areas. The survey takes about 15 minutes to complete and can be returned in the reply paid envelope supplied. Information collected is strictly confidential and will not be used in a manner that allows individual or household data to be identified. We appreciate your participation in this study.

If you would like more information about the study, you can contact the DEC Project Manager, Mr Nick Agapides on (02) 99956047 or email the project team at AEI_Project_DEC@environment.nsw.gov.au. You can also obtain more information about this study from the attached Fact Sheet or the DEC website at
http://www.environment.nsw.gov.au/decwhatsnewarchive/aeiproject.htm

What you need to do
- Use this form to record, to your best knowledge, details of the identified activities that take place at your home, or the usage of watercraft on waterways.
- Return the completed form in the supplied reply paid envelope.

How to answer
- Please use a black or blue pen.
- Please use block letters
- If you do not know how to answer, give the best answer you can.

1 Dwelling Description

Post code: ☐☐☐☐

Number of people in the household: ☐☐

Type of dwelling
- ☐ Separate house
- ☐ Semi detached, row or terrace houses and townhouses
- ☐ Flats, units or apartments
- ☐ Other dwellings. Please specify.

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

2 Garden Equipment

This section is about the usage pattern of domestic garden equipment at your home. Please provide information in the appropriate space about the ownership and usage of garden equipment in your household, to the best of your knowledge. If you are unsure about a response, leave the space blank or write "not sure". If you use a lawn service or gardener to mow your lawn, please complete section 2a.

Product type	**1. Push Lawnmower**	**2. Ride-on Lawnmower**	**3. Brush-Cutter**	**4. Hedge Trimmers**	**5. Edgers**	**6. Chippers/ Mulchers**
Number of units owned *(E.g. 1)*						
Fuel type *(E.g. unleaded petrol, lead replacement petrol, petrol/oil mix or electricity)*						
Engine type *(2 stroke, 4 stroke, electric, injected or carburetted)*						
Average operating time in Spring *(Sep-Nov) (E.g. 30 minutes each time)*						
Average operating frequency *(E.g. weekly, fortnightly, monthly)*						
Average operating time in Summer *(Dec-Feb) (E.g. 30 minutes each time)*						
Average operating frequency *(E.g. weekly, fortnightly, monthly)*						
Average operating time in Autumn *(Mar-May) (E.g. 30 minutes each time)*						
Average operating frequency *(E.g. weekly, fortnightly, monthly)*						
Average operating time in Winter *(Jun-Aug) (E.g. 30 minutes each time)*						
Average operating frequency *(E.g. weekly, fortnightly, monthly)*						
Main operating time *(E.g. weekdays/weekends)*						
How old is this device? *(E.g. 2 years old)*						

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Product type	**7. Compactors**	**8. High-pressure Cleaners**	**9. Blower**	**10. Chainsaw**	**11. Vacuums**	**12. Other** (provide details) ______
Number of units owned *(E.g. 1)*						
Fuel type *(E.g. unleaded petrol, lead replacement petrol, petrol/oil mix or electricity)*						
Engine type *(2 stroke, 4 stroke, electric, injected or carburetted)*						
Average operating time in Spring *(Sep-Nov) (E.g. 30 minutes each time)*						
Average operating frequency *(E.g. weekly, fortnightly, monthly)*						
Average operating time in Summer *(Dec-Feb)(E.g. 30 minutes each time)*						
Average operating frequency *(E.g. weekly, fortnightly, monthly)*						
Average operating time in Autumn *(Mar-May) (E.g. 30 minutes each time)*						
Average operating frequency *(E.g. weekly, fortnightly, monthly)*						
Average operating time in Winter *(Jun-Aug) (E.g. 30 minutes each time)*						
Average operating frequency *(E.g. weekly, fortnightly, monthly)*						
Main operating time *(E.g. weekdays/weekends)*						
How old is this device? *(E.g. 2 years old)*						

2a Lawn Mowing Contractor

Please complete this section if you have someone (e.g. a gardener) mow your lawn for you.
(tick appropriate boxes)

i) How often does the person mow the lawn in spring? ☐ weekly ☐ fortnightly ☐ monthly ☐ never

ii) How often does the person mow the lawn in summer? ☐ weekly ☐ fortnightly ☐ monthly ☐ never

iii) How often does the person mow the lawn in autumn? ☐ weekly ☐ fortnightly ☐ monthly ☐ never

iv) How often does the person mow the lawn in winter? ☐ weekly ☐ fortnightly ☐ monthly ☐ never

v) How long (estimate) does it take to mow your lawn? ☐ 10 min ☐ 30 min ☐ 1 hr ☐ 2 hr ☐ 4 hr ☐ Other ______

vi) What other types of equipment does the person use? ☐ Push mower ☐ Ride-on lawn mower ☐ Edge trimmer ☐ Other ______

3 Solid Fuel (Wood or Coal)

Please complete this section if you have a combustion heater (using wood or coal), including slow combustion heater, air recirculation heater, potbelly stove, and open fireplace.

3a. What type of wood/coal heating do you have? *(if you have more than one wood heater, please select the main heating source)*	☐ Slow Combustion heater (With Australian Standard compliance plate) ☐ Slow Combustion heater (Without Australian Standard compliance plate) ☐ Air Recirculation heater ☐ Potbelly stove, Conventional heater (enclosed and control burn time by limiting the amount of air that can be used for combustion) ☐ Open fireplace (typically masonry and built into the wall structure)
3b. Which months do you use wood/coal for heating?	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec
3c. How many times a week do you use wood/coal heating?	☐ Most days ☐ 4-5 times a weeks ☐ 2-3 times a week ☐ About once a week ☐ Less than once a week ☐ Week days ☐ Weekend days only
3d. When do you use wood/coal heating?	☐ Night time only ☐ Day and night
3e. How much firewood/coal do you typically use in a full year?	(Approximate in tons, trailer loads, or cubic metres) ________ tonnes ________ trailer loads (of approximately 2 m^3 each) ________ cubic metres
3f. Where do you get your firewood or coal?	☐ From a wood/coal merchant ☐ Collect from woodland ☐ From a service station or market ☐ Other ________
3g. What type of fuel do you normally use?	☐ Hard wood (e.g. eucalypt) ☐ Coal ☐ Softwood (e.g. pine)
3h. How old is this appliance?	☐ The heater was installed prior to 1996 ☐ The heater was Installed during or after 1996 This heater is approximately ________ years old. (Estimate if unsure)

4 Liquid Fuel Heating – Fuel Oil, Kerosene

Please complete this section if you use liquid fuel (fuel oil or kerosene) for heating at your home.

4a. Do you use fuel oil or kerosene, or any other liquid fuels for heating in your home?	☐ No. (Go to Section 5) ☐ Yes, fuel oil. ☐ Yes, kerosene ☐ Yes, other. (provide details) ________.
4b. How much fuel oil/kerosene was used last year? (number of litres)	
4c. Which months do you use fuel oil/kerosene for heating?	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec
4d. How many times a week do you use fuel oil/kerosene heating?	☐ Most days ☐ 4-5 times a weeks ☐ 2-3 times a week ☐ About once a week ☐ Less than once a week
4e. When do you use fuel oil/kerosene heating?	☐ Night time only ☐ Day and night

5 Natural Gas Usage

Please complete this section if you have a natural gas or town gas connection to your home.

5a. Do you have natural gas or town gas connection in your home?	☐ No. (Go to Section 6) ☐ Yes, natural gas.
5b. What do you use the gas connection for	☐ Heating ☐ Cooking ☐ Hot water
5c. How much did you pay for gas usage for Summer quarter?	
5d. How much did you pay for gas usage for Winter quarter?	
5d. How much did you pay for gas usage for Spring and Autumn quarter?	

6 Cooking Appliances: Barbecues, Portable (camping) Stoves

Please complete this section if you use a barbecue or a portable stove outdoors at your home.

6a What type of appliance do you have?

☐ Barbecue (natural gas with piped connection)	☐ Barbecue (LPG)	☐ Barbecue (Briquettes)	☐ Barbecue (wood)
☐ Stove – (natural gas with piped connection)	☐ Portable stove (butane cartridge)		

Skip to section 7 if you use only electric barbecues or stoves at home.

6b Fuel usage pattern

Appliance	**Stove**	**Barbecue (gas fuel)**	**Barbecue (solid fuel)**	**Portable stove (gas fuel)**
Number of units owned? (*E.g. 1*)				
Average operating time in Spring (Sep-Nov) *(E.g. 60 minutes each time)*				
Average operating frequency (daily, weekly, fortnightly, monthly)				
Average operating time in Summer (Dec-Feb) *(E.g. 60 minutes each time)*				
Average operating frequency (daily, weekly, fortnightly, monthly)				

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Average operating time in Autumn (Mar-May) *(E.g. 60 minutes each time)*				
Average operating frequency (daily, weekly, fortnightly, monthly)				
Average operating time in Winter (Jun-Aug) *(E.g. 60 minutes each time)*				
Average operating frequency (daily, weekly, fortnightly, monthly)				
Main operating time (week days/weekends)				
How old is this device?				

7 Watercraft

Answer this section if you own a watercraft with motor (e.g. boat with inboard motor, sail boat with outboard motor, jet ski, etc.).

Watercraft 1 (*If you own more than one type, use Watercraft 2 on the next page for the second one*)

7a. What type of watercraft do you have?	☐ Dinghy with outboard motor ☐ Boat with outboard motor ☐ Boat with inboard motor ☐ Jet ski
7b. What type of fuel does it use?	☐ Lead replacement Petrol ☐ Unleaded Petrol ☐ Diesel
7c. What is the capacity of the engine? (*in cc or horsepower*)	
7d. What is type of engine is it? *(e.g. 2 stroke carburettor, 2 stroke injected, 4 stroke carburettor or 4 stroke injected.)*	
7d. How old is the engine?	
7e. Where do you normally use this watercraft?	☐ Port Stevens ☐ Hunter River ☐ Lake Macquarie ☐ Tuggerah Lake ☐ Broken Bay ☐ Hawkesbury River ☐ Port Jackson ☐ Parramatta River ☐ Nepean River ☐ Botany Bay ☐ Port Hacking ☐ Lake Illawarra ☐ Other River ☐ Open Ocean
7f. Which months do you use the watercraft?	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec

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7g. In the months that you indicated, how often do you use the watercraft?	☐ Most days ☐ 2-3 times a weeks ☐ About once a week ☐ Less than once a month
7h. How long do you normally operate the engine on the days when you use the watercraft	☐ Less than 1hour ☐ 1-3 hours ☐ 3-6 hours ☐ Longer than 6 hours

Watercraft 2 (*If you have more than 2 watercraft, please contact the project team for additional forms, or to provide survey answers over the phone*)

7i. What type of watercraft do you have?	☐ Dinghy with outboard motor ☐ Boat with outboard motor ☐ Boat with inboard motor ☐ Jet ski
7j. What type of fuel does it use?	☐ Lead replacement Petrol ☐ Unleaded Petrol ☐ Diesel
7k. What is the capacity of the engine? (*in cc or horsepower*)	
7l. What is type of engine is it? (*e.g. 2 stroke carburettor, 2 stroke injected, 4 stroke carburettor or 4 stroke injected.*)	
7m. How old is the engine?	
7n. Where do you normally use this watercraft?	☐ Port Stevens ☐ Hunter River ☐ Lake Macquarie ☐ Tuggerah Lake ☐ Broken Bay ☐ Hawkesbury River ☐ Port Jackson ☐ Parramatta River ☐ Nepean River ☐ Botany Bay ☐ Port Hacking ☐ Lake Illawarra ☐ Other River ☐ Open Ocean
7o. Which months do you use the watercraft?	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec
7p. In the months that you indicated, how often do you use the watercraft?	☐ Most days ☐ 2-3 times a weeks ☐ About once a week ☐ Less than once a month
7q. How long do you normally operate the engine on the days when you use the watercraft?	☐ Less than 1hour ☐ 1-3 hours ☐ 3-6 hours ☐ Longer than 6 hours

8 Follow Up

May we contact you to clarify your survey response? Yes/No. If yes, the contact person is: ________________

Contact Number: ________________________ Preferred contact time: ______________________________

Thank you for completing this form. DEC Project Team

Appendix C: Estimated Annual Emissions of all Substances from Off-Road Mobile Sources

Table C1.1: Annual Emissions from Aircraft - LTO

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
1,3-BUTADIENE	6.57	5.25×10^{-01}	6.81×10^{-03}	8.29×10^{-02}	7.18
1-BUTENE	7.78	6.54×10^{-01}	8.65×10^{-03}	1.05×10^{-01}	8.55
1-DECENE	6.70×10^{-01}	5.54×10^{-02}	7.39×10^{-04}	9.02×10^{-03}	7.35×10^{-01}
1-HEXENE	3.24	2.73×10^{-01}	3.62×10^{-03}	4.41×10^{-02}	3.56
1-NONENE	9.50×10^{-01}	8.10×10^{-02}	1.06×10^{-03}	1.29×10^{-02}	1.04
1-PENTENE	3.32	2.81×10^{-01}	3.67×10^{-03}	4.48×10^{-02}	3.65
2,2,4-TRIMETHYLPENTANE	1.62×10^{-01}	6.66×10^{-03}	1.85×10^{-04}	2.21×10^{-03}	1.71×10^{-01}
2-METHYL-2-BUTENE	7.90×10^{-01}	6.65×10^{-02}	8.76×10^{-04}	1.07×10^{-02}	8.68×10^{-01}
2-METHYLPENTANE	1.54	1.30×10^{-01}	1.71×10^{-03}	2.08×10^{-02}	1.69
ACENAPHTHENE	4.12×10^{-02}	1.30×10^{-03}	9.31×10^{-05}	1.73×10^{-03}	4.43×10^{-02}
ACENAPHTHYLENE	2.32×10^{-01}	7.32×10^{-03}	5.25×10^{-04}	9.79×10^{-03}	2.50×10^{-01}
ACETALDEHYDE	$1.62 \times 10^{+01}$	1.29	1.48×10^{-02}	1.86×10^{-01}	$1.77 \times 10^{+01}$
ACETONE	9.83	7.93×10^{-01}	1.18×10^{-02}	1.42×10^{-01}	$1.08 \times 10^{+01}$
ACETYLENE	$1.65 \times 10^{+01}$	1.39	1.82×10^{-02}	2.22×10^{-01}	$1.81 \times 10^{+01}$
ACROLEIN	7.77	6.14×10^{-01}	6.86×10^{-03}	8.65×10^{-02}	8.48
ANTHRACENE	2.67×10^{-02}	1.67×10^{-04}	3.67×10^{-05}	3.84×10^{-04}	2.73×10^{-02}
ARSENIC AND COMPOUNDS	2.89×10^{-01}	1.08×10^{-02}	3.50×10^{-04}	1.16×10^{-02}	3.12×10^{-01}
BENZALDEHYDE	2.18	1.82×10^{-01}	2.46×10^{-03}	2.99×10^{-02}	2.39
BENZENE	8.56	7.21×10^{-01}	1.17×10^{-02}	1.37×10^{-01}	9.43
BENZO(A)ANTHRACENE	5.66×10^{-03}	1.78×10^{-04}	1.28×10^{-05}	2.38×10^{-04}	6.09×10^{-03}
BENZO(A)PYRENE	5.65×10^{-03}	1.78×10^{-04}	1.28×10^{-05}	2.38×10^{-04}	6.08×10^{-03}
BENZO(B)FLUORANTHENE	6.77×10^{-03}	2.13×10^{-04}	1.53×10^{-05}	2.85×10^{-04}	7.28×10^{-03}
BENZO(G,H,I)PERYLENE	1.47×10^{-02}	4.62×10^{-04}	3.32×10^{-05}	6.18×10^{-04}	1.58×10^{-02}
BENZO(K)FLUORANTHENE	6.77×10^{-03}	2.13×10^{-04}	1.53×10^{-05}	2.85×10^{-04}	7.28×10^{-03}
BUTYL BENZENE	9.50×10^{-01}	8.10×10^{-02}	1.06×10^{-03}	1.29×10^{-02}	1.04
BUTYRALDEHYDE	4.76	3.97×10^{-01}	5.42×10^{-03}	6.58×10^{-02}	5.23
C16 BRANCHED ALKANE	5.55×10^{-01}	4.84×10^{-02}	6.20×10^{-04}	7.55×10^{-03}	6.12×10^{-01}
C6H18O3SI3	$3.65 \times 10^{+01}$	2.67	4.50×10^{-02}	5.42×10^{-01}	$3.98 \times 10^{+01}$
C7-C16 PARAFFINS	1.19	1.01×10^{-01}	1.31×10^{-03}	1.60×10^{-02}	1.30
C8H24O4SI4	$1.18 \times 10^{+01}$	8.76×10^{-01}	1.51×10^{-02}	1.80×10^{-01}	$1.29 \times 10^{+01}$
CADMIUM AND COMPOUNDS	2.73×10^{-02}	1.02×10^{-03}	3.30×10^{-05}	1.09×10^{-03}	2.94×10^{-02}
CARBON MONOXIDE	$3.21 \times 10^{+03}$	$1.25 \times 10^{+02}$	7.70	$8.85 \times 10^{+01}$	$3.43 \times 10^{+03}$
CHROMIUM (III) COMPOUNDS	2.09×10^{-01}	7.77×10^{-03}	2.76×10^{-04}	8.41×10^{-03}	2.25×10^{-01}
CHROMIUM (VI) COMPOUNDS	9.04×10^{-02}	3.36×10^{-03}	1.19×10^{-04}	3.64×10^{-03}	9.75×10^{-02}
CHRYSENE	5.66×10^{-03}	1.78×10^{-04}	1.28×10^{-05}	2.38×10^{-04}	6.08×10^{-03}
CIS-2-BUTENE	1.90	1.59×10^{-01}	2.13×10^{-03}	2.59×10^{-02}	2.09
COBALT AND COMPOUNDS	1.04×10^{-02}	3.38×10^{-04}	4.59×10^{-05}	4.85×10^{-04}	1.13×10^{-02}
COPPER AND COMPOUNDS	1.04×10^{-02}	3.38×10^{-04}	4.59×10^{-05}	4.85×10^{-04}	1.13×10^{-02}
ETHANE	3.50	2.91×10^{-01}	4.04×10^{-03}	4.90×10^{-02}	3.85
ETHYLBENZENE	1.27	1.17×10^{-01}	2.65×10^{-03}	2.95×10^{-02}	1.42

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
ETHYLENE	$6.89 \times 10^{+01}$	5.82	7.61×10^{-02}	9.29×10^{-01}	$7.57 \times 10^{+01}$
FLUORANTHENE	5.16×10^{-02}	1.63×10^{-03}	1.16×10^{-04}	2.16×10^{-03}	5.55×10^{-02}
FLUORENE	8.51×10^{-02}	2.68×10^{-03}	1.93×10^{-04}	3.59×10^{-03}	9.16×10^{-02}
FORMALDEHYDE	$5.29 \times 10^{+01}$	4.20	4.88×10^{-02}	6.13×10^{-01}	$5.77 \times 10^{+01}$
GLYOXAL	$1.00 \times 10^{+01}$	7.77×10^{-01}	1.15×10^{-02}	1.39×10^{-01}	$1.10 \times 10^{+01}$
HEPTENE	2.14	1.76×10^{-01}	2.41×10^{-03}	2.94×10^{-02}	2.35
HEXADECANE	4.81×10^{-01}	3.91×10^{-02}	5.72×10^{-04}	6.91×10^{-03}	5.27×10^{-01}
HEXANAL	8.32×10^{-01}	6.98×10^{-02}	9.36×10^{-04}	1.14×10^{-02}	9.14×10^{-01}
INDENO(1,2,3-C,D)PYRENE	4.51×10^{-03}	1.42×10^{-04}	1.02×10^{-05}	1.90×10^{-04}	4.85×10^{-03}
ISOMERS OF DODECANE	7.11×10^{-01}	6.00×10^{-02}	7.85×10^{-04}	9.58×10^{-03}	7.81×10^{-01}
ISOMERS OF PENTADECANE	6.71×10^{-01}	5.68×10^{-02}	7.40×10^{-04}	9.03×10^{-03}	7.37×10^{-01}
ISOMERS OF PENTENE	2.88	2.42×10^{-01}	3.17×10^{-03}	3.87×10^{-02}	3.16
ISOMERS OF TETRADECANE	7.50×10^{-01}	6.33×10^{-02}	8.30×10^{-04}	1.01×10^{-02}	8.24×10^{-01}
ISOMERS OF XYLENE	4.41	4.15×10^{-01}	9.99×10^{-03}	1.10×10^{-01}	4.94
LEAD AND COMPOUNDS	3.00×10^{-01}	1.12×10^{-02}	3.63×10^{-04}	1.20×10^{-02}	3.23×10^{-01}
MANGANESE AND COMPOUNDS	1.04×10^{-02}	3.38×10^{-04}	4.59×10^{-05}	4.85×10^{-04}	1.13×10^{-02}
METHANE	$3.83 \times 10^{+01}$	3.12	4.36×10^{-02}	5.29×10^{-01}	$4.20 \times 10^{+01}$
METHYL GLYOXAL	7.79	6.54×10^{-01}	8.68×10^{-03}	1.06×10^{-01}	8.56
METHYL NAPHTHALENES	1.94	1.64×10^{-01}	2.14×10^{-03}	2.62×10^{-02}	2.13
NAPHTHALENE	7.15	2.50×10^{-01}	1.39×10^{-02}	2.43×10^{-01}	7.66
N-DECANE	1.67	1.40×10^{-01}	1.90×10^{-03}	2.31×10^{-02}	1.83
N-DODECANE	4.28	3.49×10^{-01}	5.05×10^{-03}	6.10×10^{-02}	4.69
N-HEPTADECANE	3.97×10^{-02}	3.26×10^{-03}	4.52×10^{-05}	5.50×10^{-04}	4.35×10^{-02}
N-HEPTANE	2.39×10^{-01}	2.09×10^{-02}	2.72×10^{-04}	3.30×10^{-03}	2.64×10^{-01}
N-HEXANE	3.31×10^{-01}	3.41×10^{-02}	1.02×10^{-03}	1.10×10^{-02}	3.77×10^{-01}
NICKEL AND COMPOUNDS	3.77×10^{-02}	1.36×10^{-03}	7.89×10^{-05}	1.58×10^{-03}	4.07×10^{-02}
NITRIC OXIDE	$1.63 \times 10^{+03}$	$1.54 \times 10^{+01}$	3.39×10^{-01}	4.74	$1.66 \times 10^{+03}$
NITROGEN DIOXIDE	$1.32 \times 10^{+02}$	1.24	2.73×10^{-02}	3.82×10^{-01}	$1.34 \times 10^{+02}$
N-NONANE	5.20×10^{-01}	4.24×10^{-02}	6.18×10^{-04}	7.46×10^{-03}	5.71×10^{-01}
N-OCTANE	1.96×10^{-01}	1.63×10^{-02}	2.11×10^{-04}	2.59×10^{-03}	2.15×10^{-01}
N-PENTADECANE	1.03	8.47×10^{-02}	1.19×10^{-03}	1.44×10^{-02}	1.13
N-PENTANE	8.30×10^{-01}	6.98×10^{-02}	9.21×10^{-04}	1.12×10^{-02}	9.12×10^{-01}
N-TETRADECANE	2.30	1.90×10^{-01}	2.64×10^{-03}	3.20×10^{-02}	2.53
N-TRIDECANE	2.62	2.16×10^{-01}	2.99×10^{-03}	3.63×10^{-02}	2.88
N-UNDECANE	2.10	1.74×10^{-01}	2.38×10^{-03}	2.90×10^{-02}	2.31
OCTENE	1.11	9.40×10^{-02}	1.22×10^{-03}	1.49×10^{-02}	1.22
OXIDES OF NITROGEN	$2.64 \times 10^{+03}$	$2.48 \times 10^{+01}$	5.47×10^{-01}	7.65	$2.67 \times 10^{+03}$
PARTICULATE MATTER < 10 µm	$7.16 \times 10^{+01}$	2.58	1.50×10^{-01}	2.99	$7.73 \times 10^{+01}$
PARTICULATE MATTER < 2.5 µm	$6.59 \times 10^{+01}$	2.37	1.38×10^{-01}	2.75	$7.11 \times 10^{+01}$
PENTYL BENZENE	7.51×10^{-01}	6.47×10^{-02}	8.31×10^{-04}	1.01×10^{-02}	8.27×10^{-01}
PHENANTHRENE	1.44×10^{-01}	4.56×10^{-03}	3.25×10^{-04}	6.05×10^{-03}	1.55×10^{-01}
PHENOL	9.50×10^{-01}	8.10×10^{-02}	1.06×10^{-03}	1.29×10^{-02}	1.04
POLYCYCLIC AROMATIC HYDROCARBONS	7.85	2.72×10^{-01}	1.54×10^{-02}	2.72×10^{-01}	8.41
PROPANE	7.20×10^{-01}	6.01×10^{-02}	8.44×10^{-04}	1.02×10^{-02}	7.91×10^{-01}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
PROPIONALDEHYDE	3.30	2.61×10^{-01}	2.93×10^{-03}	3.71×10^{-02}	3.60
PROPYLENE	$2.03 \times 10^{+01}$	1.72	2.25×10^{-02}	2.74×10^{-01}	$2.23 \times 10^{+01}$
PYRENE	7.02×10^{-02}	2.22×10^{-03}	1.58×10^{-04}	2.95×10^{-03}	7.55×10^{-02}
STYRENE	1.51	1.24×10^{-01}	1.68×10^{-03}	2.03×10^{-02}	1.66
SULFUR DIOXIDE	$1.86 \times 10^{+02}$	2.58	4.16×10^{-02}	8.09×10^{-01}	$1.90 \times 10^{+02}$
TOLUENE	6.70	6.49×10^{-01}	1.67×10^{-02}	1.83×10^{-01}	7.55
TOTAL SUSPENDED PARTICULATES	$7.54 \times 10^{+01}$	2.71	1.58×10^{-01}	3.15	$8.14 \times 10^{+01}$
TOTAL VOCS	$3.54 \times 10^{+02}$	$2.89 \times 10^{+01}$	4.04×10^{-01}	4.90	$3.89 \times 10^{+02}$
ZINC AND COMPOUNDS	3.10×10^{-01}	1.15×10^{-02}	4.09×10^{-04}	1.25×10^{-02}	3.35×10^{-01}

Table C1.2: Annual Emissions from Aircraft – GSE/APU

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
1,1,1-TRICHLOROETHANE	1.84×10^{-02}	5.23×10^{-04}	2.54×10^{-07}	2.52×10^{-04}	1.92×10^{-02}
1,1,2-TRICHLOROETHANE	1.50×10^{-02}	4.26×10^{-04}	2.07×10^{-07}	2.05×10^{-04}	1.56×10^{-02}
1,2,3-TRIMETHYLBENZENE	1.39×10^{-01}	3.95×10^{-03}	1.92×10^{-06}	1.91×10^{-03}	1.45×10^{-01}
1,2,4-TRIMETHYLBENZENE	1.63	4.64×10^{-02}	2.26×10^{-05}	2.24×10^{-02}	1.70
1,2-DIETHYLBENZENE	1.60×10^{-01}	4.56×10^{-03}	2.22×10^{-06}	2.20×10^{-03}	1.67×10^{-01}
1,3,5-TRIMETHYLBENZENE	9.02×10^{-01}	2.56×10^{-02}	1.25×10^{-05}	1.24×10^{-02}	9.40×10^{-01}
1,3-BUTADIENE	1.04	2.97×10^{-02}	1.44×10^{-05}	1.43×10^{-02}	1.09
1,4-BUTANEDIOL	1.71×10^{-03}	4.86×10^{-05}	2.37×10^{-08}	2.34×10^{-05}	1.78×10^{-03}
1-BUTENE	5.94×10^{-01}	1.69×10^{-02}	8.21×10^{-06}	8.14×10^{-03}	6.19×10^{-01}
1-BUTYNE	8.55×10^{-04}	2.43×10^{-05}	1.18×10^{-08}	1.17×10^{-05}	8.91×10^{-04}
1-CHLOROBUTANE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
1-DECENE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
1-HEXENE	1.50×10^{-01}	4.26×10^{-03}	2.07×10^{-06}	2.05×10^{-03}	1.56×10^{-01}
1-METHYL-3-ETHYLBENZENE	2.06×10^{-01}	5.85×10^{-03}	2.85×10^{-06}	2.82×10^{-03}	2.14×10^{-01}
1-METHYL-3-PROPYLBENZENE	8.56×10^{-02}	2.43×10^{-03}	1.18×10^{-06}	1.17×10^{-03}	8.92×10^{-02}
1-METHYL-4-ETHYLBENZENE	5.10×10^{-01}	1.45×10^{-02}	7.05×10^{-06}	6.98×10^{-03}	5.31×10^{-01}
1-METHYLNAPHTHALENE	3.70×10^{-01}	1.05×10^{-02}	5.12×10^{-06}	5.08×10^{-03}	3.86×10^{-01}
1-METHYLPHENANTHRENE	1.67×10^{-02}	4.74×10^{-04}	2.31×10^{-07}	2.28×10^{-04}	1.74×10^{-02}
1-PENTENE	2.19×10^{-01}	6.23×10^{-03}	3.03×10^{-06}	3.01×10^{-03}	2.28×10^{-01}
1-UNDECENE	7.49×10^{-02}	2.13×10^{-03}	1.04×10^{-06}	1.03×10^{-03}	7.80×10^{-02}
2,2,4-TRIMETHYLPENTANE	2.36	6.71×10^{-02}	3.26×10^{-05}	3.23×10^{-02}	2.46
2,2,5-TRIMETHYLHEXANE	1.28×10^{-01}	3.65×10^{-03}	1.78×10^{-06}	1.76×10^{-03}	1.34×10^{-01}
2,2-DICHLORONITROANILINE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
2,2-DIMETHYLBUTANE	4.21×10^{-01}	1.20×10^{-02}	5.83×10^{-06}	5.78×10^{-03}	4.39×10^{-01}
2,3,3-TRIMETHYLPENTANE	2.25×10^{-01}	6.39×10^{-03}	3.11×10^{-06}	3.08×10^{-03}	2.34×10^{-01}
2,3,4-TRIMETHYLPENTANE	4.43×10^{-01}	1.26×10^{-02}	6.13×10^{-06}	6.07×10^{-03}	4.61×10^{-01}
2,3,5-TRIMETHYLHEXANE	4.28×10^{-02}	1.22×10^{-03}	5.92×10^{-07}	5.86×10^{-04}	4.46×10^{-02}
2,3-DIMETHYLBUTANE	1.08	3.08×10^{-02}	1.50×10^{-05}	1.48×10^{-02}	1.13
2,3-DIMETHYLHEXANE	1.57×10^{-01}	4.46×10^{-03}	2.17×10^{-06}	2.15×10^{-03}	1.63×10^{-01}
2,3-DIMETHYLOCTANE	2.78×10^{-01}	7.91×10^{-03}	3.85×10^{-06}	3.81×10^{-03}	2.90×10^{-01}
2,3-DIMETHYLPENTANE	7.06×10^{-01}	2.01×10^{-02}	9.76×10^{-06}	9.67×10^{-03}	7.36×10^{-01}
2,4,4-TRIMETHYL-1-PENTENE	9.25×10^{-01}	2.63×10^{-02}	1.28×10^{-05}	1.27×10^{-02}	9.64×10^{-01}
2,4-DIMETHYLHEPTANE	4.28×10^{-02}	1.22×10^{-03}	5.92×10^{-07}	5.86×10^{-04}	4.46×10^{-02}
2,4-DIMETHYLHEXANE	2.74×10^{-01}	7.78×10^{-03}	3.79×10^{-06}	3.75×10^{-03}	2.85×10^{-01}
2,4-DIMETHYLPENTANE	7.44×10^{-01}	2.12×10^{-02}	1.03×10^{-05}	1.02×10^{-02}	7.75×10^{-01}
2,5-DIMETHYLHEPTANE	6.95×10^{-02}	1.98×10^{-03}	9.62×10^{-07}	9.53×10^{-04}	7.24×10^{-02}
2,5-DIMETHYLHEXANE	4.91×10^{-02}	1.40×10^{-03}	6.79×10^{-07}	6.73×10^{-04}	5.12×10^{-02}
2,6-DIMETHYLOCTANE	3.74×10^{-02}	1.06×10^{-03}	5.18×10^{-07}	5.13×10^{-04}	3.90×10^{-02}
2-BUTYNE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
2-FURFURAL	1.58×10^{-02}	4.50×10^{-04}	2.19×10^{-07}	2.17×10^{-04}	1.65×10^{-02}
2-HEXENE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
2-METHYL-1-BUTENE	2.55×10^{-01}	7.26×10^{-03}	3.53×10^{-06}	3.50×10^{-03}	2.66×10^{-01}
2-METHYL-2-BUTENE	5.88×10^{-02}	1.67×10^{-03}	8.14×10^{-07}	8.06×10^{-04}	6.13×10^{-02}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
2-METHYL-2-PENTENE	3.88×10^{-01}	1.10×10^{-02}	5.36×10^{-06}	5.31×10^{-03}	4.04×10^{-01}
2-METHYL-2-PROPENAL	3.92	1.11×10^{-01}	5.42×10^{-05}	5.37×10^{-02}	4.09
2-METHYL-3-HEXANONE	2.99×10^{-03}	8.51×10^{-05}	4.14×10^{-08}	4.10×10^{-05}	3.12×10^{-03}
2-METHYLANTHRACENE	1.01×10^{-02}	2.88×10^{-04}	1.40×10^{-07}	1.39×10^{-04}	1.06×10^{-02}
2-METHYLCHOLANTHRENE	7.05×10^{-02}	2.00×10^{-03}	9.75×10^{-07}	9.66×10^{-04}	7.34×10^{-02}
2-METHYLDECANE	3.37×10^{-01}	9.58×10^{-03}	4.66×10^{-06}	4.62×10^{-03}	3.51×10^{-01}
2-METHYLHEPTANE	2.37×10^{-01}	6.74×10^{-03}	3.28×10^{-06}	3.25×10^{-03}	2.47×10^{-01}
2-METHYLHEXANE	5.59×10^{-01}	1.59×10^{-02}	7.73×10^{-06}	7.66×10^{-03}	5.82×10^{-01}
2-METHYLNAPHTHALENE	5.99×10^{-01}	1.70×10^{-02}	8.28×10^{-06}	8.21×10^{-03}	6.24×10^{-01}
2-METHYLOCTANE	2.14×10^{-02}	6.08×10^{-04}	2.96×10^{-07}	2.93×10^{-04}	2.23×10^{-02}
2-METHYLPENTANE	2.41	6.87×10^{-02}	3.34×10^{-05}	3.31×10^{-02}	2.52
3-ETHYLHEXANE	2.06×10^{-01}	5.85×10^{-03}	2.85×10^{-06}	2.82×10^{-03}	2.14×10^{-01}
3-METHYL-1-BUTENE	2.32×10^{-01}	6.59×10^{-03}	3.21×10^{-06}	3.18×10^{-03}	2.42×10^{-01}
3-METHYLHEPTANE	1.87×10^{-01}	5.32×10^{-03}	2.59×10^{-06}	2.57×10^{-03}	1.95×10^{-01}
3-METHYLHEXANE	3.04×10^{-01}	8.65×10^{-03}	4.21×10^{-06}	4.17×10^{-03}	3.17×10^{-01}
3-METHYLOCTANE	1.66×10^{-01}	4.71×10^{-03}	2.29×10^{-06}	2.27×10^{-03}	1.73×10^{-01}
3-METHYLPENTANE	1.48	4.21×10^{-02}	2.05×10^{-05}	2.03×10^{-02}	1.54
3-METHYL-PHENANTHRENE	2.97×10^{-02}	8.45×10^{-04}	4.11×10^{-07}	4.07×10^{-04}	3.10×10^{-02}
4-METHYLANILINE	1.28×10^{-03}	3.65×10^{-05}	1.77×10^{-08}	1.76×10^{-05}	1.34×10^{-03}
4-METHYLHEPTANE	1.34×10^{-01}	3.80×10^{-03}	1.85×10^{-06}	1.83×10^{-03}	1.39×10^{-01}
4-METHYLOCTANE	2.09×10^{-01}	5.93×10^{-03}	2.89×10^{-06}	2.86×10^{-03}	2.17×10^{-01}
4-PHENYL-1-BUTENE	1.39×10^{-01}	3.95×10^{-03}	1.92×10^{-06}	1.91×10^{-03}	1.45×10^{-01}
9-METHYLPHENANTHRENE	2.25×10^{-02}	6.39×10^{-04}	3.11×10^{-07}	3.08×10^{-04}	2.34×10^{-02}
ACENAPHTHENE	2.26×10^{-01}	6.42×10^{-03}	3.12×10^{-06}	3.10×10^{-03}	2.35×10^{-01}
ACENAPHTHYLENE	4.64×10^{-01}	1.32×10^{-02}	6.42×10^{-06}	6.36×10^{-03}	4.84×10^{-01}
ACETALDEHYDE	$4.13 \times 10^{+01}$	1.17	5.71×10^{-04}	5.66×10^{-01}	$4.30 \times 10^{+01}$
ACETIC ACID	3.12×10^{-02}	8.88×10^{-04}	4.32×10^{-07}	4.28×10^{-04}	3.25×10^{-02}
ACETIC ANHYDRIDE	1.50×10^{-02}	4.26×10^{-04}	2.07×10^{-07}	2.05×10^{-04}	1.56×10^{-02}
ACETONE	6.29×10^{-02}	1.79×10^{-03}	8.70×10^{-07}	8.62×10^{-04}	6.55×10^{-02}
ACETOPHENONE	5.00	1.42×10^{-01}	6.92×10^{-05}	6.85×10^{-02}	5.21
ACETYLENE	5.93	1.69×10^{-01}	8.20×10^{-05}	8.13×10^{-02}	6.18
ACROLEIN	3.39	9.63×10^{-02}	4.69×10^{-05}	4.64×10^{-02}	3.53
ACRYLIC ACID	1.92×10^{-02}	5.47×10^{-04}	2.66×10^{-07}	2.64×10^{-04}	2.01×10^{-02}
ACRYLONITRILE	2.48×10^{-02}	7.05×10^{-04}	3.43×10^{-07}	3.40×10^{-04}	2.58×10^{-02}
ADIPIC ACID	1.71×10^{-02}	4.86×10^{-04}	2.37×10^{-07}	2.34×10^{-04}	1.78×10^{-02}
ALIPHATICS	4.28×10^{-03}	1.22×10^{-04}	5.92×10^{-08}	5.86×10^{-05}	4.46×10^{-03}
ALKENE KETONE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
ALPHA-PINENE	1.50×10^{-02}	4.26×10^{-04}	2.07×10^{-07}	2.05×10^{-04}	1.56×10^{-02}
ANILINE	3.38×10^{-02}	9.61×10^{-04}	4.67×10^{-07}	4.63×10^{-04}	3.52×10^{-02}
ANTHRACENE	9.43×10^{-02}	2.68×10^{-03}	1.30×10^{-06}	1.29×10^{-03}	9.83×10^{-02}
ANTHRAQUINONE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
BENZALDEHYDE	3.73	1.06×10^{-01}	5.15×10^{-05}	5.11×10^{-02}	3.88
BENZENE	6.76	1.92×10^{-01}	9.36×10^{-05}	9.27×10^{-02}	7.05
BENZO(A)ANTHRACENE	4.12×10^{-02}	1.17×10^{-03}	5.70×10^{-07}	5.64×10^{-04}	4.29×10^{-02}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
BENZO(A)PYRENE	3.64×10^{-02}	1.04×10^{-03}	5.04×10^{-07}	4.99×10^{-04}	3.79×10^{-02}
BENZO(B)FLUORANTHENE	2.51×10^{-02}	7.14×10^{-04}	3.47×10^{-07}	3.44×10^{-04}	2.62×10^{-02}
BENZO(E)PYRENE	2.56×10^{-02}	7.27×10^{-04}	3.54×10^{-07}	3.50×10^{-04}	2.66×10^{-02}
BENZO(G,H,I)FLUORANTHENE	5.62×10^{-03}	1.60×10^{-04}	7.77×10^{-08}	7.70×10^{-05}	5.85×10^{-03}
BENZO(G,H,I)PERYLENE	3.13×10^{-02}	8.89×10^{-04}	4.33×10^{-07}	4.29×10^{-04}	3.26×10^{-02}
BENZO(K)FLUORANTHENE	2.43×10^{-02}	6.91×10^{-04}	3.36×10^{-07}	3.33×10^{-04}	2.53×10^{-02}
BENZOIC ACID	1.71×10^{-03}	4.86×10^{-05}	2.37×10^{-08}	2.34×10^{-05}	1.78×10^{-03}
BENZYL CHLORIDE	1.80×10^{-02}	5.11×10^{-04}	2.48×10^{-07}	2.46×10^{-04}	1.87×10^{-02}
BETA-PINENE	9.84×10^{-03}	2.80×10^{-04}	1.36×10^{-07}	1.35×10^{-04}	1.03×10^{-02}
BIPHENYL	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
B-PHELLANDRENE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
BROMODINITROBENZENE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
BUTOXYBUTENE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
BUTOXYETHOXYETHANOL ACETATE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
BUTYL ACRYLATE	1.84×10^{-02}	5.23×10^{-04}	2.54×10^{-07}	2.52×10^{-04}	1.92×10^{-02}
BUTYL BENZENE	1.12×10^{-01}	3.19×10^{-03}	1.55×10^{-06}	1.54×10^{-03}	1.17×10^{-01}
BUTYL BENZOATE	8.98×10^{-03}	2.55×10^{-04}	1.24×10^{-07}	1.23×10^{-04}	9.36×10^{-03}
BUTYL CARBITOL	1.67×10^{-02}	4.74×10^{-04}	2.31×10^{-07}	2.29×10^{-04}	1.74×10^{-02}
BUTYL CELLOSOLVE	1.88×10^{-02}	5.35×10^{-04}	2.60×10^{-07}	2.58×10^{-04}	1.96×10^{-02}
BUTYLCYCLOHEXANE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
BUTYLISOPROPYLPHTHALATE	2.14×10^{-03}	6.08×10^{-05}	2.96×10^{-08}	2.93×10^{-05}	2.23×10^{-03}
BUTYRALDEHYDE	1.29	3.68×10^{-02}	1.79×10^{-05}	1.77×10^{-02}	1.35
C10 AROMATIC	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
C10 OLEFINS	1.28×10^{-03}	3.65×10^{-05}	1.77×10^{-08}	1.76×10^{-05}	1.34×10^{-03}
C2 ALKYL INDAN	1.71×10^{-03}	4.86×10^{-05}	2.37×10^{-08}	2.34×10^{-05}	1.78×10^{-03}
C2 CYCLOHEXANE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
C3 CYCLOHEXANE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
C3/C4/C5 ALKYLBENZENES	1.28×10^{-03}	3.65×10^{-05}	1.77×10^{-08}	1.76×10^{-05}	1.34×10^{-03}
C-3-HEXENE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
C4 SUBSTITUTED CYCLOHEXANE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
C4 SUBSTITUTED CYCLOHEXANONE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
C5 ESTER	8.55×10^{-04}	2.43×10^{-05}	1.18×10^{-08}	1.17×10^{-05}	8.91×10^{-04}
C5 OLEFIN	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
C5 PARAFFIN	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
C5 SUBSTITUTED CYCLOHEXANE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
C6 SUBSTITUTED CYCLOHEXANE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
C6H18O3SI3	3.85×10^{-03}	1.09×10^{-04}	5.32×10^{-08}	5.28×10^{-05}	4.01×10^{-03}
C-7 CYCLOPARAFFINS	3.04×10^{-02}	8.63×10^{-04}	4.20×10^{-07}	4.16×10^{-04}	3.16×10^{-02}
C7-C16 PARAFFINS	6.41×10^{-03}	1.82×10^{-04}	8.87×10^{-08}	8.79×10^{-05}	6.68×10^{-03}
C-8 CYCLOPARAFFINS	2.14×10^{-03}	6.08×10^{-05}	2.96×10^{-08}	2.93×10^{-05}	2.23×10^{-03}
C8 PARAFFIN	8.55×10^{-04}	2.43×10^{-05}	1.18×10^{-08}	1.17×10^{-05}	8.91×10^{-04}
C8H24O4SI4	1.28×10^{-03}	3.65×10^{-05}	1.77×10^{-08}	1.76×10^{-05}	1.34×10^{-03}
CADMIUM AND COMPOUNDS	6.15×10^{-03}	1.70×10^{-04}	2.47×10^{-07}	5.72×10^{-05}	6.38×10^{-03}
CAMPHENE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
CARBITOL	1.97×10^{-02}	5.59×10^{-04}	2.72×10^{-07}	2.70×10^{-04}	2.05×10^{-02}
CARBON MONOXIDE	$6.77 \times 10^{+03}$	$1.93 \times 10^{+02}$	7.54×10^{-02}	$9.51 \times 10^{+01}$	$7.06 \times 10^{+03}$
CARBON SULFIDE	3.85×10^{-03}	1.09×10^{-04}	5.32×10^{-08}	5.28×10^{-05}	4.01×10^{-03}
CARBON TETRACHLORIDE	2.78×10^{-02}	7.90×10^{-04}	3.85×10^{-07}	3.81×10^{-04}	2.90×10^{-02}
CARBONYL SULFIDE	1.28×10^{-03}	3.65×10^{-05}	1.77×10^{-08}	1.76×10^{-05}	1.34×10^{-03}
CELLOSOLVE	1.54×10^{-02}	4.38×10^{-04}	2.13×10^{-07}	2.11×10^{-04}	1.60×10^{-02}
CELLOSOLVE ACETATE	1.54×10^{-02}	4.38×10^{-04}	2.13×10^{-07}	2.11×10^{-04}	1.60×10^{-02}
CHLOROBENZENE	3.04×10^{-02}	8.63×10^{-04}	4.20×10^{-07}	4.16×10^{-04}	3.16×10^{-02}
CHLORODIFLUOROMETHANE	6.84×10^{-03}	1.95×10^{-04}	9.47×10^{-08}	9.38×10^{-05}	7.13×10^{-03}
CHLOROFORM	2.18×10^{-02}	6.20×10^{-04}	3.02×10^{-07}	2.99×10^{-04}	2.27×10^{-02}
CHLOROPENTAFLUOROETHANE	8.55×10^{-04}	2.43×10^{-05}	1.18×10^{-08}	1.17×10^{-05}	8.91×10^{-04}
CHLOROPRENE	1.45×10^{-02}	4.13×10^{-04}	2.01×10^{-07}	1.99×10^{-04}	1.52×10^{-02}
CHLOROTRIFLUOROMETHANE	2.14×10^{-03}	6.08×10^{-05}	2.96×10^{-08}	2.93×10^{-05}	2.23×10^{-03}
CHROMIUM (III) COMPOUNDS	1.03×10^{-03}	2.83×10^{-05}	4.12×10^{-08}	9.53×10^{-06}	1.06×10^{-03}
CHROMIUM (VI) COMPOUNDS	4.39×10^{-04}	1.21×10^{-05}	1.77×10^{-08}	4.08×10^{-06}	4.56×10^{-04}
CHRYSENE	2.64×10^{-02}	7.50×10^{-04}	3.65×10^{-07}	3.61×10^{-04}	2.75×10^{-02}
CIS-1,4 DIMETHYLCYCLOHEXANE	4.28×10^{-02}	1.22×10^{-03}	5.92×10^{-07}	5.86×10^{-04}	4.46×10^{-02}
CIS-2-BUTENE	6.13×10^{-01}	1.74×10^{-02}	8.48×10^{-06}	8.40×10^{-03}	6.39×10^{-01}
CIS-2-HEXENE	1.57×10^{-01}	4.46×10^{-03}	2.17×10^{-06}	2.15×10^{-03}	1.63×10^{-01}
CIS-2-PENTENE	5.19×10^{-01}	1.48×10^{-02}	7.18×10^{-06}	7.11×10^{-03}	5.41×10^{-01}
COBALT AND COMPOUNDS	1.03×10^{-03}	2.83×10^{-05}	4.12×10^{-08}	9.53×10^{-06}	1.06×10^{-03}
COPPER AND COMPOUNDS	2.34×10^{-03}	6.46×10^{-05}	9.42×10^{-08}	2.18×10^{-05}	2.43×10^{-03}
CORONENE	9.90×10^{-04}	2.82×10^{-05}	1.37×10^{-08}	1.36×10^{-05}	1.03×10^{-03}
CREOSOTE	1.58×10^{-02}	4.50×10^{-04}	2.19×10^{-07}	2.17×10^{-04}	1.65×10^{-02}
CRESOL	1.62×10^{-02}	4.62×10^{-04}	2.25×10^{-07}	2.23×10^{-04}	1.69×10^{-02}
CROTONALDEHYDE	$1.31 \times 10^{+01}$	3.73×10^{-01}	1.82×10^{-04}	1.80×10^{-01}	$1.37 \times 10^{+01}$
CYCLOHEXANE	2.44×10^{-01}	6.95×10^{-03}	3.38×10^{-06}	3.35×10^{-03}	2.55×10^{-01}
CYCLOHEXANOL	1.92×10^{-02}	5.47×10^{-04}	2.66×10^{-07}	2.64×10^{-04}	2.01×10^{-02}
CYCLOHEXANONE	2.27×10^{-02}	6.45×10^{-04}	3.14×10^{-07}	3.11×10^{-04}	2.36×10^{-02}
CYCLOHEXENE	8.45×10^{-01}	2.40×10^{-02}	1.17×10^{-05}	1.16×10^{-02}	8.81×10^{-01}
CYCLOPENTA(C,D)PYRENE	2.69×10^{-02}	7.66×10^{-04}	3.72×10^{-07}	3.69×10^{-04}	2.81×10^{-02}
CYCLOPENTANE	6.58×10^{-01}	1.87×10^{-02}	9.11×10^{-06}	9.03×10^{-03}	6.86×10^{-01}
CYCLOPENTENE	3.61×10^{-01}	1.03×10^{-02}	4.99×10^{-06}	4.95×10^{-03}	3.76×10^{-01}
CYCLOPENTYLCYCLOPENTANE	2.46×10^{-01}	7.00×10^{-03}	3.40×10^{-06}	3.37×10^{-03}	2.56×10^{-01}
DECANOIC ACID	7.14×10^{-02}	2.03×10^{-03}	9.87×10^{-07}	9.78×10^{-04}	7.44×10^{-02}
DECYLCYCLOHEXANE	3.75×10^{-02}	1.07×10^{-03}	5.19×10^{-07}	5.14×10^{-04}	3.91×10^{-02}
DENATURANT	4.28×10^{-03}	1.22×10^{-04}	5.92×10^{-08}	5.86×10^{-05}	4.46×10^{-03}
DIACETYL	8.82×10^{-01}	2.51×10^{-02}	1.22×10^{-05}	1.21×10^{-02}	9.19×10^{-01}
DIBENZO(A,H)ANTHRACENE	1.56×10^{-02}	4.42×10^{-04}	2.15×10^{-07}	2.13×10^{-04}	1.62×10^{-02}
DIBENZOFURAN	2.81×10^{-02}	7.98×10^{-04}	3.88×10^{-07}	3.85×10^{-04}	2.93×10^{-02}
DIBUTYL PHTHALATE	1.71×10^{-03}	4.86×10^{-05}	2.37×10^{-08}	2.34×10^{-05}	1.78×10^{-03}
DICHLOROBENZENES	8.55×10^{-04}	2.43×10^{-05}	1.18×10^{-08}	1.17×10^{-05}	8.91×10^{-04}
DICHLORODIFLUOROMETHANE	1.50×10^{-02}	4.26×10^{-04}	2.07×10^{-07}	2.05×10^{-04}	1.56×10^{-02}
DICHLOROMETHANE	3.21×10^{-02}	9.12×10^{-04}	4.44×10^{-07}	4.40×10^{-04}	3.34×10^{-02}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
DICHLOROTETRAFLUORETHANE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
DIETHYLCYCLOHEXANE	1.28×10^{-03}	3.65×10^{-05}	1.77×10^{-08}	1.76×10^{-05}	1.34×10^{-03}
DIETHYLENE GLYCOL	1.88×10^{-02}	5.35×10^{-04}	2.60×10^{-07}	2.58×10^{-04}	1.96×10^{-02}
DIISOPROPYL BENZENE	1.62×10^{-02}	4.62×10^{-04}	2.25×10^{-07}	2.23×10^{-04}	1.69×10^{-02}
DIMETHYL FORMAMIDE	1.54×10^{-02}	4.38×10^{-04}	2.13×10^{-07}	2.11×10^{-04}	1.60×10^{-02}
DIMETHYL PHTHALATE	2.57×10^{-03}	7.30×10^{-05}	3.55×10^{-08}	3.52×10^{-05}	2.67×10^{-03}
DIMETHYLCYCLOHEXANE	2.14×10^{-03}	6.08×10^{-05}	2.96×10^{-08}	2.93×10^{-05}	2.23×10^{-03}
DIMETHYLCYCLOPENTANE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
DIMETHYLETHER	4.79×10^{-02}	1.36×10^{-03}	6.63×10^{-07}	6.57×10^{-04}	4.99×10^{-02}
DIMETHYLOCTANES	1.28×10^{-03}	3.65×10^{-05}	1.77×10^{-08}	1.76×10^{-05}	1.34×10^{-03}
DIPROPYLENE GLYCOL	2.82×10^{-02}	8.03×10^{-04}	3.90×10^{-07}	3.87×10^{-04}	2.94×10^{-02}
D-LIMONENE	2.14×10^{-03}	6.08×10^{-05}	2.96×10^{-08}	2.93×10^{-05}	2.23×10^{-03}
DODECENE	2.14×10^{-02}	6.08×10^{-04}	2.96×10^{-07}	2.93×10^{-04}	2.23×10^{-02}
EICOSANE	2.02×10^{-01}	5.74×10^{-03}	2.79×10^{-06}	2.77×10^{-03}	2.10×10^{-01}
EPICHLOROHYDRIN	1.80×10^{-02}	5.11×10^{-04}	2.48×10^{-07}	2.46×10^{-04}	1.87×10^{-02}
ETHANE	3.69×10^{-01}	1.05×10^{-02}	5.10×10^{-06}	5.06×10^{-03}	3.85×10^{-01}
ETHANOLAMINE	1.88×10^{-02}	5.35×10^{-04}	2.60×10^{-07}	2.58×10^{-04}	1.96×10^{-02}
ETHYL ACETATE	1.88×10^{-02}	5.35×10^{-04}	2.60×10^{-07}	2.58×10^{-04}	1.96×10^{-02}
ETHYL ACRYLATE	2.14×10^{-02}	6.08×10^{-04}	2.96×10^{-07}	2.93×10^{-04}	2.23×10^{-02}
ETHYL ALCOHOL	5.82×10^{-02}	1.65×10^{-03}	8.05×10^{-07}	7.97×10^{-04}	6.06×10^{-02}
ETHYL CHLORIDE	1.24×10^{-02}	3.53×10^{-04}	1.72×10^{-07}	1.70×10^{-04}	1.29×10^{-02}
ETHYL ETHER	2.65×10^{-02}	7.54×10^{-04}	3.67×10^{-07}	3.63×10^{-04}	2.76×10^{-02}
ETHYL MERCAPTAN	1.41×10^{-02}	4.01×10^{-04}	1.95×10^{-07}	1.93×10^{-04}	1.47×10^{-02}
ETHYL STYRENE	1.28×10^{-03}	3.65×10^{-05}	1.77×10^{-08}	1.76×10^{-05}	1.34×10^{-03}
ETHYLBENZENE	2.00	5.69×10^{-02}	2.77×10^{-05}	2.74×10^{-02}	2.09
ETHYLCYCLOHEXANE	8.55×10^{-04}	2.43×10^{-05}	1.18×10^{-08}	1.17×10^{-05}	8.91×10^{-04}
ETHYLCYCLOPENTANE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
ETHYLENE	$1.07 \times 10^{+01}$	3.05×10^{-01}	1.48×10^{-04}	1.47×10^{-01}	$1.12 \times 10^{+01}$
ETHYLENE DIBROMIDE	1.80×10^{-02}	5.11×10^{-04}	2.48×10^{-07}	2.46×10^{-04}	1.87×10^{-02}
ETHYLENE DICHLORIDE	2.48×10^{-02}	7.05×10^{-04}	3.43×10^{-07}	3.40×10^{-04}	2.58×10^{-02}
ETHYLENE GLYCOL	1.58×10^{-02}	4.50×10^{-04}	2.19×10^{-07}	2.17×10^{-04}	1.65×10^{-02}
ETHYLENE OXIDE	1.62×10^{-02}	4.62×10^{-04}	2.25×10^{-07}	2.23×10^{-04}	1.69×10^{-02}
ETHYLENEAMINES	1.88×10^{-02}	5.35×10^{-04}	2.60×10^{-07}	2.58×10^{-04}	1.96×10^{-02}
ETHYLHEPTENE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
ETHYLHEXANE	8.55×10^{-04}	2.43×10^{-05}	1.18×10^{-08}	1.17×10^{-05}	8.91×10^{-04}
ETHYLISOPROPYL ETHER	8.55×10^{-04}	2.43×10^{-05}	1.18×10^{-08}	1.17×10^{-05}	8.91×10^{-04}
ETHYLMETHYLCYCLOHEXANES	8.55×10^{-04}	2.43×10^{-05}	1.18×10^{-08}	1.17×10^{-05}	8.91×10^{-04}
ETHYL-PHENYL-PHENYL-ETHANE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
ETHYLTOLUENE	8.55×10^{-04}	2.43×10^{-05}	1.18×10^{-08}	1.17×10^{-05}	8.91×10^{-04}
FLUORANTHENE	8.75×10^{-02}	2.49×10^{-03}	1.21×10^{-06}	1.20×10^{-03}	9.11×10^{-02}
FLUORENE	2.30×10^{-01}	6.55×10^{-03}	3.19×10^{-06}	3.16×10^{-03}	2.40×10^{-01}
FORMALDEHYDE	$2.32 \times 10^{+01}$	6.59×10^{-01}	3.21×10^{-04}	3.18×10^{-01}	$2.42 \times 10^{+01}$
FORMIC ACID	1.80×10^{-02}	5.11×10^{-04}	2.48×10^{-07}	2.46×10^{-04}	1.87×10^{-02}
GLYOXAL	2.06	5.86×10^{-02}	2.85×10^{-05}	2.82×10^{-02}	2.15

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
HEPTADECANE	6.02×10^{-01}	1.71×10^{-02}	8.32×10^{-06}	8.25×10^{-03}	6.27×10^{-01}
HEPTANAL	3.14	8.92×10^{-02}	4.34×10^{-05}	4.30×10^{-02}	3.27
HEPTENE	2.18×10^{-02}	6.20×10^{-04}	3.02×10^{-07}	2.99×10^{-04}	2.27×10^{-02}
HEPTYLCYCLOHEXANE	1.96×10^{-02}	5.56×10^{-04}	2.71×10^{-07}	2.68×10^{-04}	2.04×10^{-02}
HEXADECANE	6.97×10^{-01}	1.98×10^{-02}	9.65×10^{-06}	9.56×10^{-03}	7.27×10^{-01}
HEXAFLUOROETHANE	1.71×10^{-02}	4.86×10^{-04}	2.37×10^{-07}	2.34×10^{-04}	1.78×10^{-02}
HEXALDEHYDE	2.16	6.13×10^{-02}	2.98×10^{-05}	2.96×10^{-02}	2.25
HEXAMETHYLENEDIAMINE	2.87×10^{-02}	8.15×10^{-04}	3.96×10^{-07}	3.93×10^{-04}	2.99×10^{-02}
HEXYLCYCLOHEXANE	1.47×10^{-02}	4.17×10^{-04}	2.03×10^{-07}	2.01×10^{-04}	1.53×10^{-02}
HEXYLENE GLYCOL	1.54×10^{-02}	4.38×10^{-04}	2.13×10^{-07}	2.11×10^{-04}	1.60×10^{-02}
HEXYNE	1.07×10^{-02}	3.04×10^{-04}	1.48×10^{-07}	1.47×10^{-04}	1.11×10^{-02}
INDANE	1.71×10^{-01}	4.87×10^{-03}	2.37×10^{-06}	2.35×10^{-03}	1.78×10^{-01}
INDENO(1,2,3-C,D)PYRENE	2.66×10^{-02}	7.55×10^{-04}	3.67×10^{-07}	3.64×10^{-04}	2.77×10^{-02}
ISOBUTANE	1.83	5.22×10^{-02}	2.54×10^{-05}	2.51×10^{-02}	1.91
ISOBUTYL ACRYLATE	1.62×10^{-02}	4.62×10^{-04}	2.25×10^{-07}	2.23×10^{-04}	1.69×10^{-02}
ISOBUTYL ALCOHOL	1.80×10^{-02}	5.11×10^{-04}	2.48×10^{-07}	2.46×10^{-04}	1.87×10^{-02}
ISOBUTYL ISOBUTYRATE	1.67×10^{-02}	4.74×10^{-04}	2.31×10^{-07}	2.29×10^{-04}	1.74×10^{-02}
ISOBUTYLENE	1.12	3.18×10^{-02}	1.55×10^{-05}	1.53×10^{-02}	1.16
ISOBUTYRALDEHYDE	1.80×10^{-02}	5.11×10^{-04}	2.48×10^{-07}	2.46×10^{-04}	1.87×10^{-02}
ISOMERS OF BUTENE	2.14×10^{-03}	6.08×10^{-05}	2.96×10^{-08}	2.93×10^{-05}	2.23×10^{-03}
ISOMERS OF BUTYLBENZENE	2.57×10^{-03}	7.30×10^{-05}	3.55×10^{-08}	3.52×10^{-05}	2.67×10^{-03}
ISOMERS OF C10H18	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
ISOMERS OF DECANE	1.71×10^{-02}	4.86×10^{-04}	2.37×10^{-07}	2.34×10^{-04}	1.78×10^{-02}
ISOMERS OF DIETHYLBENZENE	1.28×10^{-03}	3.65×10^{-05}	1.77×10^{-08}	1.76×10^{-05}	1.34×10^{-03}
ISOMERS OF DODECANE	1.97×10^{-02}	5.59×10^{-04}	2.72×10^{-07}	2.70×10^{-04}	2.05×10^{-02}
ISOMERS OF ETHYLTOLUENE	1.71×10^{-03}	4.86×10^{-05}	2.37×10^{-08}	2.34×10^{-05}	1.78×10^{-03}
ISOMERS OF HEPTADECANE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
ISOMERS OF HEPTANE	1.07×10^{-02}	3.04×10^{-04}	1.48×10^{-07}	1.47×10^{-04}	1.11×10^{-02}
ISOMERS OF HEXANE	2.31×10^{-02}	6.57×10^{-04}	3.19×10^{-07}	3.17×10^{-04}	2.41×10^{-02}
ISOMERS OF NONANE	8.12×10^{-03}	2.31×10^{-04}	1.12×10^{-07}	1.11×10^{-04}	8.47×10^{-03}
ISOMERS OF OCTADECANE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
ISOMERS OF OCTANE	6.41×10^{-03}	1.82×10^{-04}	8.87×10^{-08}	8.79×10^{-05}	6.68×10^{-03}
ISOMERS OF PENTADECANE	1.80×10^{-02}	5.11×10^{-04}	2.48×10^{-07}	2.46×10^{-04}	1.87×10^{-02}
ISOMERS OF PENTANE	4.75×10^{-02}	1.35×10^{-03}	6.57×10^{-07}	6.51×10^{-04}	4.95×10^{-02}
ISOMERS OF PENTENE	2.14×10^{-03}	6.08×10^{-05}	2.96×10^{-08}	2.93×10^{-05}	2.23×10^{-03}
ISOMERS OF PROPYLBENZENE	8.55×10^{-04}	2.43×10^{-05}	1.18×10^{-08}	1.17×10^{-05}	8.91×10^{-04}
ISOMERS OF TETRADECANE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
ISOMERS OF UNDECANE	2.14×10^{-03}	6.08×10^{-05}	2.96×10^{-08}	2.93×10^{-05}	2.23×10^{-03}
ISOMERS OF XYLENE	8.37	2.38×10^{-01}	1.16×10^{-04}	1.15×10^{-01}	8.72
ISOPENTANE	8.59	2.44×10^{-01}	1.19×10^{-04}	1.18×10^{-01}	8.95
ISOPRENE	5.35×10^{-02}	1.52×10^{-03}	7.40×10^{-07}	7.33×10^{-04}	5.57×10^{-02}
ISOPROPYL ACETATE	2.01×10^{-02}	5.72×10^{-04}	2.78×10^{-07}	2.75×10^{-04}	2.09×10^{-02}
ISOPROPYL ALCOHOL	3.12×10^{-02}	8.88×10^{-04}	4.32×10^{-07}	4.28×10^{-04}	3.25×10^{-02}
ISOPROPYLBENZENE	1.62×10^{-02}	4.62×10^{-04}	2.25×10^{-07}	2.23×10^{-04}	1.69×10^{-02}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
LACTOL SPIRITS	1.54×10^{-02}	4.38×10^{-04}	2.13×10^{-07}	2.11×10^{-04}	1.60×10^{-02}
LAURIC ACID	5.74×10^{-02}	1.63×10^{-03}	7.94×10^{-07}	7.87×10^{-04}	5.98×10^{-02}
LEAD AND COMPOUNDS	1.03×10^{-03}	2.84×10^{-05}	4.12×10^{-08}	9.58×10^{-06}	1.07×10^{-03}
MALEIC ANHYDRIDE	2.99×10^{-03}	8.51×10^{-05}	4.14×10^{-08}	4.10×10^{-05}	3.12×10^{-03}
MANGANESE AND COMPOUNDS	1.90×10^{-03}	5.25×10^{-05}	7.65×10^{-08}	1.77×10^{-05}	1.97×10^{-03}
M-DIETHYLBENZENE	1.23×10^{-01}	3.50×10^{-03}	1.70×10^{-06}	1.69×10^{-03}	1.28×10^{-01}
METHANE	1.31	3.73×10^{-02}	1.81×10^{-05}	1.80×10^{-02}	1.37
METHYL ACETATE	3.04×10^{-02}	8.63×10^{-04}	4.20×10^{-07}	4.16×10^{-04}	3.16×10^{-02}
METHYL ACRYLATE	1.62×10^{-02}	4.62×10^{-04}	2.25×10^{-07}	2.23×10^{-04}	1.69×10^{-02}
METHYL ALCOHOL	5.99×10^{-02}	1.70×10^{-03}	8.28×10^{-07}	8.21×10^{-04}	6.24×10^{-02}
METHYL AMYL KETONE	2.18×10^{-02}	6.20×10^{-04}	3.02×10^{-07}	2.99×10^{-04}	2.27×10^{-02}
METHYL CARBITOL	1.67×10^{-02}	4.74×10^{-04}	2.31×10^{-07}	2.29×10^{-04}	1.74×10^{-02}
METHYL CELLOSOLVE	1.67×10^{-02}	4.74×10^{-04}	2.31×10^{-07}	2.29×10^{-04}	1.74×10^{-02}
METHYL ETHYL KETONE	7.40	2.11×10^{-01}	1.02×10^{-04}	1.01×10^{-01}	7.72
METHYL FORMATE	8.98×10^{-03}	2.55×10^{-04}	1.24×10^{-07}	1.23×10^{-04}	9.36×10^{-03}
METHYL GLYOXAL	1.67	4.74×10^{-02}	2.31×10^{-05}	2.29×10^{-02}	1.74
METHYL ISOBUTYL KETONE	2.39×10^{-02}	6.81×10^{-04}	3.31×10^{-07}	3.28×10^{-04}	2.50×10^{-02}
METHYL METHACRYLATE	1.97×10^{-02}	5.59×10^{-04}	2.72×10^{-07}	2.70×10^{-04}	2.05×10^{-02}
METHYL MYRISTATE	1.28×10^{-03}	3.65×10^{-05}	1.77×10^{-08}	1.76×10^{-05}	1.34×10^{-03}
METHYL NAPHTHALENES	1.71×10^{-03}	4.86×10^{-05}	2.37×10^{-08}	2.34×10^{-05}	1.78×10^{-03}
METHYL PALMITATE	3.42×10^{-03}	9.73×10^{-05}	4.73×10^{-08}	4.69×10^{-05}	3.57×10^{-03}
METHYL STEARATE	4.70×10^{-03}	1.34×10^{-04}	6.51×10^{-08}	6.45×10^{-05}	4.90×10^{-03}
METHYL STYRENE	1.75×10^{-02}	4.99×10^{-04}	2.43×10^{-07}	2.40×10^{-04}	1.83×10^{-02}
METHYL TERT-BUTYL ETHER	$1.05 \times 10^{+01}$	2.99×10^{-01}	1.46×10^{-04}	1.44×10^{-01}	$1.10 \times 10^{+01}$
METHYLACETYLENE	1.28×10^{-01}	3.65×10^{-03}	1.78×10^{-06}	1.76×10^{-03}	1.34×10^{-01}
METHYLAL	7.27×10^{-03}	2.07×10^{-04}	1.01×10^{-07}	9.96×10^{-05}	7.58×10^{-03}
METHYLALLENE	1.71×10^{-02}	4.86×10^{-04}	2.37×10^{-07}	2.34×10^{-04}	1.78×10^{-02}
METHYLCYCLOHEXANE	6.49×10^{-01}	1.84×10^{-02}	8.97×10^{-06}	8.89×10^{-03}	6.76×10^{-01}
METHYLCYCLOOCTANE	1.76×10^{-01}	5.02×10^{-03}	2.44×10^{-06}	2.42×10^{-03}	1.84×10^{-01}
METHYLCYCLOPENTANE	1.20	3.42×10^{-02}	1.66×10^{-05}	1.65×10^{-02}	1.25
METHYLCYCLOPENTENE	1.60×10^{-02}	4.56×10^{-04}	2.22×10^{-07}	2.20×10^{-04}	1.67×10^{-02}
METHYLDECANES	8.55×10^{-04}	2.43×10^{-05}	1.18×10^{-08}	1.17×10^{-05}	8.91×10^{-04}
METHYLENE BROMIDE	1.28×10^{-03}	3.65×10^{-05}	1.77×10^{-08}	1.76×10^{-05}	1.34×10^{-03}
METHYLHEXANE	1.28×10^{-03}	3.65×10^{-05}	1.77×10^{-08}	1.76×10^{-05}	1.34×10^{-03}
METHYLNONANE	8.55×10^{-04}	2.43×10^{-05}	1.18×10^{-08}	1.17×10^{-05}	8.91×10^{-04}
METHYLOCTANES	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
METHYLPENTANE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
METHYLPROPYLCYCLOHEXANES	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
M-ETHYLTOLUENE	8.56×10^{-02}	2.43×10^{-03}	1.18×10^{-06}	1.17×10^{-03}	8.92×10^{-02}
METHYLUNDECANE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
MINERAL SPIRITS	2.74×10^{-02}	7.78×10^{-04}	3.79×10^{-07}	3.75×10^{-04}	2.85×10^{-02}
M-XYLENE	1.14	3.25×10^{-02}	1.58×10^{-05}	1.57×10^{-02}	1.19
MYRCENE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
MYRISTIC ACID	5.25×10^{-03}	1.49×10^{-04}	7.27×10^{-08}	7.20×10^{-05}	5.47×10^{-03}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
NAPHTHA	2.01×10^{-02}	5.72×10^{-04}	2.78×10^{-07}	2.75×10^{-04}	2.09×10^{-02}
NAPHTHALENE	7.95	2.26×10^{-01}	1.10×10^{-04}	1.09×10^{-01}	8.28
N-BUTANE	$1.57 \times 10^{+01}$	4.48×10^{-01}	2.18×10^{-04}	2.16×10^{-01}	$1.64 \times 10^{+01}$
N-BUTYL ACETATE	2.48×10^{-02}	7.05×10^{-04}	3.43×10^{-07}	3.40×10^{-04}	2.58×10^{-02}
N-BUTYL ALCOHOL	2.95×10^{-02}	8.39×10^{-04}	4.08×10^{-07}	4.04×10^{-04}	3.08×10^{-02}
N-DECANE	8.19×10^{-02}	2.33×10^{-03}	1.13×10^{-06}	1.12×10^{-03}	8.54×10^{-02}
N-DODECANE	5.01×10^{-01}	1.43×10^{-02}	6.93×10^{-06}	6.87×10^{-03}	5.22×10^{-01}
N-HENEICOSANE	6.45×10^{-02}	1.83×10^{-03}	8.92×10^{-07}	8.84×10^{-04}	6.72×10^{-02}
N-HEPTANE	8.51×10^{-01}	2.42×10^{-02}	1.18×10^{-05}	1.17×10^{-02}	8.87×10^{-01}
N-HEXANE	7.71×10^{-01}	2.19×10^{-02}	1.07×10^{-05}	1.06×10^{-02}	8.04×10^{-01}
NICKEL AND COMPOUNDS	4.39×10^{-04}	1.21×10^{-05}	1.77×10^{-08}	4.08×10^{-06}	4.56×10^{-04}
NITRIC OXIDE	$2.72 \times 10^{+02}$	7.06	9.81×10^{-03}	2.86	$2.82 \times 10^{+02}$
NITROBENZENE	1.41×10^{-02}	4.01×10^{-04}	1.95×10^{-07}	1.93×10^{-04}	1.47×10^{-02}
NITROGEN DIOXIDE	$2.19 \times 10^{+01}$	5.70×10^{-01}	7.92×10^{-04}	2.31×10^{-01}	$2.27 \times 10^{+01}$
N-NONANE	2.16×10^{-01}	6.13×10^{-03}	2.98×10^{-06}	2.96×10^{-03}	2.25×10^{-01}
N-NONYLCYCLOHEXANE	2.43×10^{-02}	6.90×10^{-04}	3.36×10^{-07}	3.33×10^{-04}	2.53×10^{-02}
N-OCTANE	3.83×10^{-01}	1.09×10^{-02}	5.30×10^{-06}	5.25×10^{-03}	3.99×10^{-01}
NONADECANE	4.03×10^{-01}	1.15×10^{-02}	5.57×10^{-06}	5.52×10^{-03}	4.20×10^{-01}
NONANOIC ACID	2.35×10^{-01}	6.69×10^{-03}	3.26×10^{-06}	3.23×10^{-03}	2.45×10^{-01}
NONENONE	8.55×10^{-04}	2.43×10^{-05}	1.18×10^{-08}	1.17×10^{-05}	8.91×10^{-04}
N-PENTADECANE	7.27×10^{-03}	2.07×10^{-04}	1.01×10^{-07}	9.96×10^{-05}	7.58×10^{-03}
N-PENTANE	4.42	1.26×10^{-01}	6.12×10^{-05}	6.06×10^{-02}	4.61
N-PENTYLCYCLOHEXANE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
N-PROPYL ACETATE	2.10×10^{-02}	5.96×10^{-04}	2.90×10^{-07}	2.87×10^{-04}	2.18×10^{-02}
N-PROPYL ALCOHOL	1.80×10^{-02}	5.11×10^{-04}	2.48×10^{-07}	2.46×10^{-04}	1.87×10^{-02}
N-PROPYLBENZENE	2.64×10^{-01}	7.50×10^{-03}	3.65×10^{-06}	3.62×10^{-03}	2.75×10^{-01}
N-TETRADECANE	2.99×10^{-03}	8.51×10^{-05}	4.14×10^{-08}	4.10×10^{-05}	3.12×10^{-03}
N-TRIDECANE	4.72×10^{-01}	1.34×10^{-02}	6.53×10^{-06}	6.47×10^{-03}	4.92×10^{-01}
N-UNDECANE	7.49×10^{-02}	2.13×10^{-03}	1.04×10^{-06}	1.03×10^{-03}	7.80×10^{-02}
OCTADECANE	5.89×10^{-01}	1.68×10^{-02}	8.15×10^{-06}	8.08×10^{-03}	6.14×10^{-01}
OCTAMETHYLCYCLOTETRASILOXANE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
OCTANAL	3.04	8.64×10^{-02}	4.20×10^{-05}	4.16×10^{-02}	3.17
OCTANOIC ACID	1.22×10^{-01}	3.48×10^{-03}	1.69×10^{-06}	1.68×10^{-03}	1.28×10^{-01}
OCTYLCYCLOHEXANE	2.57×10^{-02}	7.32×10^{-04}	3.56×10^{-07}	3.53×10^{-04}	2.68×10^{-02}
O-DICHLOROBENZENE	1.71×10^{-02}	4.86×10^{-04}	2.37×10^{-07}	2.34×10^{-04}	1.78×10^{-02}
OXIDES OF NITROGEN	$4.39 \times 10^{+02}$	$1.14 \times 10^{+01}$	1.58×10^{-02}	4.62	$4.55 \times 10^{+02}$
O-XYLENE	8.14×10^{-01}	2.31×10^{-02}	1.13×10^{-05}	1.12×10^{-02}	8.48×10^{-01}
PALMITIC ACID	8.55×10^{-03}	2.43×10^{-04}	1.18×10^{-07}	1.17×10^{-04}	8.91×10^{-03}
PARAFFINS (C16-C34)	8.55×10^{-04}	2.43×10^{-05}	1.18×10^{-08}	1.17×10^{-05}	8.91×10^{-04}
PARTICULATE MATTER < 10 µm	$1.46 \times 10^{+01}$	4.04×10^{-01}	5.89×10^{-04}	1.36×10^{-01}	$1.52 \times 10^{+01}$
PARTICULATE MATTER < 2.5 µm	$1.41 \times 10^{+01}$	3.90×10^{-01}	5.89×10^{-04}	1.31×10^{-01}	$1.47 \times 10^{+01}$
P-DICHLOROBENZENE	3.08×10^{-02}	8.76×10^{-04}	4.26×10^{-07}	4.22×10^{-04}	3.21×10^{-02}
PENTADECANE	3.90×10^{-01}	1.11×10^{-02}	5.40×10^{-06}	5.35×10^{-03}	4.06×10^{-01}
PENTYLCYCLOHEXANE	8.22×10^{-02}	2.34×10^{-03}	1.14×10^{-06}	1.13×10^{-03}	8.57×10^{-02}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
PENTYNE	1.02×10^{-01}	2.89×10^{-03}	1.41×10^{-06}	1.39×10^{-03}	1.06×10^{-01}
PHENANTHRENE	2.97×10^{-01}	8.46×10^{-03}	4.12×10^{-06}	4.08×10^{-03}	3.10×10^{-01}
PHENOL	1.88×10^{-02}	5.35×10^{-04}	2.60×10^{-07}	2.58×10^{-04}	1.96×10^{-02}
PHENYL ISOCYANATE	5.13×10^{-03}	1.46×10^{-04}	7.10×10^{-08}	7.03×10^{-05}	5.35×10^{-03}
PHTHALIC ANHYDRIDE	8.55×10^{-03}	2.43×10^{-04}	1.18×10^{-07}	1.17×10^{-04}	8.91×10^{-03}
PIPERYLENE	1.71×10^{-02}	4.86×10^{-04}	2.37×10^{-07}	2.34×10^{-04}	1.78×10^{-02}
POLYCHLORINATED DIOXINS AND FURANS	1.62×10^{-06}	4.62×10^{-08}	1.80×10^{-11}	2.27×10^{-08}	1.68×10^{-06}
POLYCYCLIC AROMATIC HYDROCARBONS	9.75	2.77×10^{-01}	1.35×10^{-04}	1.34×10^{-01}	$1.02 \times 10^{+01}$
PROPADIENE	5.88×10^{-02}	1.67×10^{-03}	8.14×10^{-07}	8.06×10^{-04}	6.13×10^{-02}
PROPANE	1.03×10^{-01}	2.92×10^{-03}	1.42×10^{-06}	1.41×10^{-03}	1.07×10^{-01}
PROPIONALDEHYDE	$1.39 \times 10^{+01}$	3.94×10^{-01}	1.92×10^{-04}	1.90×10^{-01}	$1.45 \times 10^{+01}$
PROPIONIC ACID	1.71×10^{-02}	4.86×10^{-04}	2.37×10^{-07}	2.34×10^{-04}	1.78×10^{-02}
PROPYLCYCLOHEXANE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
PROPYLENE	1.60	4.56×10^{-02}	2.22×10^{-05}	2.20×10^{-02}	1.67
PROPYLENE DICHLORIDE	8.55×10^{-04}	2.43×10^{-05}	1.18×10^{-08}	1.17×10^{-05}	8.91×10^{-04}
PROPYLENE GLYCOL	1.62×10^{-02}	4.62×10^{-04}	2.25×10^{-07}	2.23×10^{-04}	1.69×10^{-02}
PROPYLENE OXIDE	2.14×10^{-02}	6.08×10^{-04}	2.96×10^{-07}	2.93×10^{-04}	2.23×10^{-02}
P-XYLENE	1.14	3.25×10^{-02}	1.58×10^{-05}	1.57×10^{-02}	1.19
PYRENE	1.13×10^{-01}	3.21×10^{-03}	1.56×10^{-06}	1.55×10^{-03}	1.18×10^{-01}
RETENE	1.12×10^{-02}	3.18×10^{-04}	1.55×10^{-07}	1.53×10^{-04}	1.17×10^{-02}
S-BUTYL ALCOHOL	1.45×10^{-02}	4.13×10^{-04}	2.01×10^{-07}	1.99×10^{-04}	1.52×10^{-02}
S-BUTYLBENZENE	2.67×10^{-02}	7.60×10^{-04}	3.70×10^{-07}	3.67×10^{-04}	2.79×10^{-02}
STYRENE	5.90×10^{-02}	1.68×10^{-03}	8.16×10^{-07}	8.08×10^{-04}	6.15×10^{-02}
SUBSTITUTED C9 ESTER (C12)	3.85×10^{-03}	1.09×10^{-04}	5.32×10^{-08}	5.28×10^{-05}	4.01×10^{-03}
SULFUR DIOXIDE	$4.53 \times 10^{+01}$	1.06	2.09×10^{-03}	4.08×10^{-01}	$4.67 \times 10^{+01}$
T-1-PHENYLBUTENE	1.23×10^{-01}	3.50×10^{-03}	1.70×10^{-06}	1.69×10^{-03}	1.28×10^{-01}
T-2-NONENE	9.09×10^{-02}	2.59×10^{-03}	1.26×10^{-06}	1.25×10^{-03}	9.47×10^{-02}
TERT-BUTYL ALCOHOL	1.80×10^{-02}	5.11×10^{-04}	2.48×10^{-07}	2.46×10^{-04}	1.87×10^{-02}
TETRACHLOROETHYLENE	2.99×10^{-02}	8.51×10^{-04}	4.14×10^{-07}	4.10×10^{-04}	3.12×10^{-02}
TETRADECANE	6.16×10^{-01}	1.75×10^{-02}	8.53×10^{-06}	8.45×10^{-03}	6.42×10^{-01}
TETRAFLUOROMETHANE	1.28×10^{-03}	3.65×10^{-05}	1.77×10^{-08}	1.76×10^{-05}	1.34×10^{-03}
TOLUENE	9.49	2.70×10^{-01}	1.31×10^{-04}	1.30×10^{-01}	9.89
TOLUENE DIISOCYANATE	2.82×10^{-02}	8.03×10^{-04}	3.90×10^{-07}	3.87×10^{-04}	2.94×10^{-02}
TOTAL AROMATIC AMINES	1.71×10^{-03}	4.86×10^{-05}	2.37×10^{-08}	2.34×10^{-05}	1.78×10^{-03}
TOTAL C2-C5 ALDEHYDES	5.13×10^{-03}	1.46×10^{-04}	7.10×10^{-08}	7.03×10^{-05}	5.35×10^{-03}
TOTAL SUSPENDED PARTICULATES	$1.54 \times 10^{+01}$	4.25×10^{-01}	6.20×10^{-04}	1.43×10^{-01}	$1.60 \times 10^{+01}$
TOTAL VOCS	$2.59 \times 10^{+02}$	7.37	3.59×10^{-03}	3.55	$2.70 \times 10^{+02}$
TRANS-2-BUTENE	9.85×10^{-01}	2.80×10^{-02}	1.36×10^{-05}	1.35×10^{-02}	1.03
TRANS-2-HEXENE	1.57×10^{-01}	4.46×10^{-03}	2.17×10^{-06}	2.15×10^{-03}	1.63×10^{-01}
TRANS-2-PENTENE	4.88×10^{-01}	1.39×10^{-02}	6.75×10^{-06}	6.68×10^{-03}	5.08×10^{-01}
TRICHLOROBENZENES	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
TRICHLOROETHYLENE	1.84×10^{-02}	5.23×10^{-04}	2.54×10^{-07}	2.52×10^{-04}	1.92×10^{-02}
TRICHLOROFLUOROMETHANE	2.61×10^{-02}	7.42×10^{-04}	3.61×10^{-07}	3.58×10^{-04}	2.72×10^{-02}
TRICHLOROTRIFLUOROETHANE	1.71×10^{-02}	4.86×10^{-04}	2.37×10^{-07}	2.34×10^{-04}	1.78×10^{-02}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
TRIDECANOIC ACID	1.29×10^{-02}	3.66×10^{-04}	1.78×10^{-07}	1.76×10^{-04}	1.34×10^{-02}
TRIFLUOROMETHANE	1.28×10^{-02}	3.65×10^{-04}	1.77×10^{-07}	1.76×10^{-04}	1.34×10^{-02}
TRIMETHYLBENZENE	4.70×10^{-03}	1.34×10^{-04}	6.51×10^{-08}	6.45×10^{-05}	4.90×10^{-03}
TRIMETHYLCYCLOHEXANES	8.55×10^{-04}	2.43×10^{-05}	1.18×10^{-08}	1.17×10^{-05}	8.91×10^{-04}
TRIMETHYLCYCLOPENTANE	4.28×10^{-04}	1.22×10^{-05}	5.92×10^{-09}	5.86×10^{-06}	4.46×10^{-04}
TRIMETHYLDECENE	8.55×10^{-04}	2.43×10^{-05}	1.18×10^{-08}	1.17×10^{-05}	8.91×10^{-04}
TRIMETHYLFLUOROSILANE	2.95×10^{-02}	8.39×10^{-04}	4.08×10^{-07}	4.04×10^{-04}	3.08×10^{-02}
TRIMETHYLHEPTANES	8.55×10^{-04}	2.43×10^{-05}	1.18×10^{-08}	1.17×10^{-05}	8.91×10^{-04}
UNDECANOIC ACID	2.02×10^{-01}	5.74×10^{-03}	2.79×10^{-06}	2.77×10^{-03}	2.10×10^{-01}
VINYL ACETATE	2.35×10^{-02}	6.69×10^{-04}	3.25×10^{-07}	3.22×10^{-04}	2.45×10^{-02}
VINYL CHLORIDE	1.80×10^{-02}	5.11×10^{-04}	2.48×10^{-07}	2.46×10^{-04}	1.87×10^{-02}
ZINC AND COMPOUNDS	2.96×10^{-02}	8.16×10^{-04}	1.19×10^{-06}	2.75×10^{-04}	3.07×10^{-02}

Table C1.3: Annual Emissions from Aircraft – Fuel Storage

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
N-DECANE	1.23	4.90×10^{-02}	4.70×10^{-05}	1.39×10^{-02}	1.29
N-DODECANE	1.14	4.55×10^{-02}	4.37×10^{-05}	1.29×10^{-02}	1.20
N-HEPTANE	6.26×10^{-03}	2.50×10^{-04}	2.40×10^{-07}	7.10×10^{-05}	6.58×10^{-03}
N-NONANE	2.94×10^{-01}	1.18×10^{-02}	1.13×10^{-05}	3.34×10^{-03}	3.09×10^{-01}
N-OCTANE	3.13×10^{-02}	1.25×10^{-03}	1.20×10^{-06}	3.55×10^{-04}	3.29×10^{-02}
N-PENTADECANE	4.51×10^{-01}	1.80×10^{-02}	1.73×10^{-05}	5.11×10^{-03}	4.74×10^{-01}
N-TETRADECANE	7.32×10^{-01}	2.93×10^{-02}	2.81×10^{-05}	8.31×10^{-03}	7.70×10^{-01}
N-TRIDECANE	1.11	4.43×10^{-02}	4.25×10^{-05}	1.26×10^{-02}	1.16
N-UNDECANE	1.27	5.08×10^{-02}	4.87×10^{-05}	1.44×10^{-02}	1.34
TOTAL VOCS	6.26	2.50×10^{-01}	2.40×10^{-04}	7.10×10^{-02}	6.58

Table C1.4: Annual Emissions from Aircraft – Engine Testing

SUBSTANCE	EMISSIONS (TONNES/YEAR)	
	SYDNEY	GMR
1,3-BUTADIENE	2.07×10^{-02}	2.07×10^{-02}
1-BUTENE	2.25×10^{-02}	2.25×10^{-02}
1-DECENE	1.94×10^{-03}	1.94×10^{-03}
1-HEXENE	9.37×10^{-03}	9.37×10^{-03}
1-NONENE	2.74×10^{-03}	2.74×10^{-03}
1-PENTENE	9.59×10^{-03}	9.59×10^{-03}
2,2,4-TRIMETHYLPENTANE	5.14×10^{-04}	5.14×10^{-04}
2-METHYL-2-BUTENE	2.28×10^{-03}	2.28×10^{-03}
2-METHYLPENTANE	4.45×10^{-03}	4.45×10^{-03}
ACETALDEHYDE	5.34×10^{-02}	5.34×10^{-02}
ACETONE	2.80×10^{-02}	2.80×10^{-02}
ACETYLENE	4.76×10^{-02}	4.76×10^{-02}
ACROLEIN	2.60×10^{-02}	2.60×10^{-02}
ANTHRACENE	4.16×10^{-07}	4.16×10^{-07}
BENZALDEHYDE	6.28×10^{-03}	6.28×10^{-03}
BENZENE	2.23×10^{-02}	2.23×10^{-02}
BENZO(A)ANTHRACENE	6.57×10^{-08}	6.57×10^{-08}
BENZO(A)PYRENE	3.63×10^{-08}	3.63×10^{-08}
BENZO(G,H,I)PERYLENE	6.04×10^{-09}	6.04×10^{-09}
BUTYL BENZENE	2.74×10^{-03}	2.74×10^{-03}
BUTYRALDEHYDE	1.37×10^{-02}	1.37×10^{-02}
C16 BRANCHED ALKANE	1.60×10^{-03}	1.60×10^{-03}
C6H18O3SI3	1.04×10^{-01}	1.04×10^{-01}
C7-C16 PARAFFINS	3.43×10^{-03}	3.43×10^{-03}
C8H24O4SI4	3.34×10^{-02}	3.34×10^{-02}
CARBON MONOXIDE	1.25	1.25
CHRYSENE	5.88×10^{-08}	5.88×10^{-08}
CIS-2-BUTENE	5.48×10^{-03}	5.48×10^{-03}
ETHANE	1.01×10^{-02}	1.01×10^{-02}
ETHYLBENZENE	1.95×10^{-03}	1.95×10^{-03}
ETHYLENE	1.99×10^{-01}	1.99×10^{-01}
FLUORANTHENE	8.74×10^{-07}	8.74×10^{-07}
FORMALDEHYDE	1.72×10^{-01}	1.72×10^{-01}
GLYOXAL	2.90×10^{-02}	2.90×10^{-02}
HEPTENE	6.17×10^{-03}	6.17×10^{-03}
HEXADECANE	1.37×10^{-03}	1.37×10^{-03}
HEXANAL	2.40×10^{-03}	2.40×10^{-03}
ISOMERS OF DODECANE	2.06×10^{-03}	2.06×10^{-03}
ISOMERS OF PENTADECANE	1.94×10^{-03}	1.94×10^{-03}
ISOMERS OF PENTENE	8.34×10^{-03}	8.34×10^{-03}
ISOMERS OF TETRADECANE	2.17×10^{-03}	2.17×10^{-03}
ISOMERS OF XYLENE	5.51×10^{-03}	5.51×10^{-03}
METHANE	1.09×10^{-01}	1.09×10^{-01}

SUBSTANCE	EMISSIONS (TONNES/YEAR)	
	SYDNEY	GMR
METHYL GLYOXAL	2.25×10^{-02}	2.25×10^{-02}
METHYL NAPHTHALENES	5.60×10^{-03}	5.60×10^{-03}
NAPHTHALENE	6.30×10^{-03}	6.30×10^{-03}
N-DECANE	4.80×10^{-03}	4.80×10^{-03}
N-DODECANE	1.22×10^{-02}	1.22×10^{-02}
N-HEPTADECANE	1.14×10^{-04}	1.14×10^{-04}
N-HEPTANE	6.85×10^{-04}	6.85×10^{-04}
NITRIC OXIDE	$8.77 \times 10^{+01}$	$8.77 \times 10^{+01}$
NITROGEN DIOXIDE	7.07	7.07
N-NONANE	1.48×10^{-03}	1.48×10^{-03}
N-OCTANE	5.71×10^{-04}	5.71×10^{-04}
N-PENTADECANE	2.97×10^{-03}	2.97×10^{-03}
N-PENTANE	2.40×10^{-03}	2.40×10^{-03}
N-TETRADECANE	6.62×10^{-03}	6.62×10^{-03}
N-TRIDECANE	7.54×10^{-03}	7.54×10^{-03}
N-UNDECANE	6.05×10^{-03}	6.05×10^{-03}
OCTENE	3.20×10^{-03}	3.20×10^{-03}
OXIDES OF NITROGEN	$1.41 \times 10^{+02}$	$1.41 \times 10^{+02}$
PENTYL BENZENE	2.17×10^{-03}	2.17×10^{-03}
PHENANTHRENE	3.90×10^{-06}	3.90×10^{-06}
PHENOL	2.74×10^{-03}	2.74×10^{-03}
POLYCYCLIC AROMATIC HYDROCARBONS	6.31×10^{-03}	6.31×10^{-03}
PROPANE	2.06×10^{-03}	2.06×10^{-03}
PROPIONALDEHYDE	1.09×10^{-02}	1.09×10^{-02}
PROPYLENE	5.88×10^{-02}	5.88×10^{-02}
PYRENE	1.06×10^{-06}	1.06×10^{-06}
STYRENE	4.52×10^{-03}	4.52×10^{-03}
SULFUR DIOXIDE	3.26	3.26
TOLUENE	5.97×10^{-03}	5.97×10^{-03}
TOTAL VOCS	1.03	1.03

Table C1.5: Annual Emissions from Commercial Boats – 2-Stroke Petrol

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
1,1,1-TRICHLOROETHANE	1.55×10^{-01}	1.89×10^{-02}	1.25×10^{-02}	2.64×10^{-01}	4.50×10^{-01}
1,1,2-TRICHLOROETHANE	1.26×10^{-01}	1.54×10^{-02}	1.02×10^{-02}	2.15×10^{-01}	3.66×10^{-01}
1,2,3-TRIMETHYLBENZENE	2.01	2.45×10^{-01}	1.62×10^{-01}	3.41	5.83
1,2,4-TRIMETHYLBENZENE	7.18	8.78×10^{-01}	5.81×10^{-01}	$1.22 \times 10^{+01}$	$2.09 \times 10^{+01}$
1,2-DIETHYLBENZENE	1.66	2.03×10^{-01}	1.34×10^{-01}	2.82	4.82
1,3,5-TRIMETHYLBENZENE	5.47	6.69×10^{-01}	4.43×10^{-01}	9.32	$1.59 \times 10^{+01}$
1,3-BUTADIENE	6.76×10^{-01}	8.26×10^{-02}	5.47×10^{-02}	1.15	1.96
1,4-BUTANEDIOL	1.44×10^{-02}	1.76×10^{-03}	1.17×10^{-03}	2.45×10^{-02}	4.19×10^{-02}
1-BUTENE	1.44×10^{-01}	1.76×10^{-02}	1.17×10^{-02}	2.45×10^{-01}	4.19×10^{-01}
1-BUTYNE	7.20×10^{-03}	8.80×10^{-04}	5.83×10^{-04}	1.23×10^{-02}	2.09×10^{-02}
1-CHLOROBUTANE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
1-DECENE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
1-HEXENE	5.45×10^{-01}	6.66×10^{-02}	4.41×10^{-02}	9.27×10^{-01}	1.58
1-METHYL-3-ISOPROPYLBENZENE	1.26	1.54×10^{-01}	1.02×10^{-01}	2.15	3.67
1-METHYL-3-PROPYLBENZENE	9.66×10^{-01}	1.18×10^{-01}	7.82×10^{-02}	1.64	2.81
1-PENTENE	4.71×10^{-01}	5.75×10^{-02}	3.81×10^{-02}	8.01×10^{-01}	1.37
2,2,4-TRIMETHYLPENTANE	$1.17 \times 10^{+01}$	1.43	9.49×10^{-01}	$2.00 \times 10^{+01}$	$3.41 \times 10^{+01}$
2,2,5-TRIMETHYLHEXANE	1.19	1.45×10^{-01}	9.62×10^{-02}	2.02	3.45
2,2-DICHLORONITROANILINE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
2,2-DIMETHYLBUTANE	1.76	2.15×10^{-01}	1.42×10^{-01}	2.99	5.11
2,2-DIMETHYLHEXANE	1.73×10^{-01}	2.12×10^{-02}	1.40×10^{-02}	2.95×10^{-01}	5.04×10^{-01}
2,3,3-TRIMETHYLPENTANE	2.72	3.33×10^{-01}	2.20×10^{-01}	4.64	7.91
2,3,4-TRIMETHYLPENTANE	2.72×10^{-01}	3.33×10^{-02}	2.20×10^{-02}	4.64×10^{-01}	7.91×10^{-01}
2,3,5-TRIMETHYLHEXANE	2.72×10^{-01}	3.33×10^{-02}	2.20×10^{-02}	4.64×10^{-01}	7.91×10^{-01}
2,3-DIMETHYLBUTANE	1.31	1.60×10^{-01}	1.06×10^{-01}	2.23	3.81
2,3-DIMETHYLPENTANE	3.10	3.78×10^{-01}	2.51×10^{-01}	5.27	8.99
2,4,4-TRIMETHYL-1-PENTENE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
2,4,5-TRIMETHYLHEPTANE	1.11	1.36×10^{-01}	9.02×10^{-02}	1.90	3.24
2,4-DIMETHYLHEPTANE	3.22×10^{-01}	3.94×10^{-02}	2.61×10^{-02}	5.48×10^{-01}	9.35×10^{-01}
2,4-DIMETHYLHEXANE	2.16×10^{-02}	2.64×10^{-03}	1.75×10^{-03}	3.68×10^{-02}	6.28×10^{-02}
2,4-DIMETHYLOCTANE	2.48×10^{-01}	3.03×10^{-02}	2.00×10^{-02}	4.22×10^{-01}	7.20×10^{-01}
2,4-DIMETHYLPENTANE	1.31	1.60×10^{-01}	1.06×10^{-01}	2.23	3.81
2,5-DIMETHYLHEXANE	1.56	1.91×10^{-01}	1.26×10^{-01}	2.66	4.53
2-BUTYNE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
2-FURFURAL	1.33×10^{-01}	1.63×10^{-02}	1.08×10^{-02}	2.27×10^{-01}	3.87×10^{-01}
2-HEXENE	1.98×10^{-01}	2.42×10^{-02}	1.60×10^{-02}	3.37×10^{-01}	5.76×10^{-01}
2-METHYL-1-BUTENE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
2-METHYL-2-BUTENE	1.26	1.54×10^{-01}	1.02×10^{-01}	2.15	3.67
2-METHYL-2-PENTENE	5.70×10^{-01}	6.96×10^{-02}	4.61×10^{-02}	9.70×10^{-01}	1.65
2-METHYL-3-HEXANONE	2.52×10^{-02}	3.08×10^{-03}	2.04×10^{-03}	4.29×10^{-02}	7.33×10^{-02}
2-METHYLDECANE	3.27	4.00×10^{-01}	2.65×10^{-01}	5.56	9.50
2-METHYLHEPTANE	5.45×10^{-01}	6.66×10^{-02}	4.41×10^{-02}	9.27×10^{-01}	1.58
2-METHYLOCTANE	4.95×10^{-02}	6.05×10^{-03}	4.01×10^{-03}	8.43×10^{-02}	1.44×10^{-01}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
2-METHYLPENTANE	3.15	3.84×10^{-01}	2.55×10^{-01}	5.35	9.14
3,4-DIMETHYLOCTANE	2.38	2.91×10^{-01}	1.92×10^{-01}	4.05	6.91
3-METHYL-1-BUTENE	4.46×10^{-01}	5.45×10^{-02}	3.61×10^{-02}	7.59×10^{-01}	1.30
3-METHYLHEPTANE	8.92×10^{-01}	1.09×10^{-01}	7.22×10^{-02}	1.52	2.59
3-METHYLHEXANE	2.28	2.78×10^{-01}	1.84×10^{-01}	3.88	6.62
3-METHYLPENTANE	2.13	2.60×10^{-01}	1.72×10^{-01}	3.63	6.19
4-METHYL-1-PENTENE	6.19×10^{-01}	7.57×10^{-02}	5.01×10^{-02}	1.05	1.80
4-METHYLANILINE	1.08×10^{-02}	1.32×10^{-03}	8.74×10^{-04}	1.84×10^{-02}	3.14×10^{-02}
4-METHYLHEPTANE	1.29	1.57×10^{-01}	1.04×10^{-01}	2.19	3.74
ACENAPHTHENE	9.09×10^{-03}	1.11×10^{-03}	7.36×10^{-04}	1.55×10^{-02}	2.64×10^{-02}
ACENAPHTHYLENE	1.81×10^{-02}	2.21×10^{-03}	1.47×10^{-03}	3.08×10^{-02}	5.26×10^{-02}
ACETALDEHYDE	5.24×10^{-01}	6.41×10^{-02}	4.24×10^{-02}	8.93×10^{-01}	1.52
ACETIC ACID	2.63×10^{-01}	3.21×10^{-02}	2.13×10^{-02}	4.48×10^{-01}	7.64×10^{-01}
ACETIC ANHYDRIDE	1.26×10^{-01}	1.54×10^{-02}	1.02×10^{-02}	2.15×10^{-01}	3.66×10^{-01}
ACETONE	5.29×10^{-01}	6.47×10^{-02}	4.28×10^{-02}	9.01×10^{-01}	1.54
ACETYLENE	5.57	6.81×10^{-01}	4.51×10^{-01}	9.48	$1.62 \times 10^{+01}$
ACROLEIN	9.45×10^{-02}	1.16×10^{-02}	7.65×10^{-03}	1.61×10^{-01}	2.75×10^{-01}
ACRYLIC ACID	1.62×10^{-01}	1.98×10^{-02}	1.31×10^{-02}	2.76×10^{-01}	4.71×10^{-01}
ACRYLONITRILE	2.09×10^{-01}	2.55×10^{-02}	1.69×10^{-02}	3.56×10^{-01}	6.07×10^{-01}
ADIPIC ACID	1.44×10^{-01}	1.76×10^{-02}	1.17×10^{-02}	2.45×10^{-01}	4.19×10^{-01}
ALIPHATICS	3.60×10^{-02}	4.40×10^{-03}	2.91×10^{-03}	6.13×10^{-02}	1.05×10^{-01}
ALKENE KETONE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
ALPHA-PINENE	1.26×10^{-01}	1.54×10^{-02}	1.02×10^{-02}	2.15×10^{-01}	3.66×10^{-01}
ANILINE	2.85×10^{-01}	3.48×10^{-02}	2.30×10^{-02}	4.84×10^{-01}	8.27×10^{-01}
ANTHRACENE	1.16×10^{-02}	1.41×10^{-03}	9.36×10^{-04}	1.97×10^{-02}	3.36×10^{-02}
ANTHRAQUINONE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
BENZALDEHYDE	5.94×10^{-01}	7.26×10^{-02}	4.81×10^{-02}	1.01	1.73
BENZENE	7.93	9.69×10^{-01}	6.42×10^{-01}	$1.35 \times 10^{+01}$	$2.30 \times 10^{+01}$
BENZO(A)ANTHRACENE	5.80×10^{-03}	7.09×10^{-04}	4.69×10^{-04}	9.87×10^{-03}	1.69×10^{-02}
BENZO(A)PYRENE	1.11×10^{-02}	1.35×10^{-03}	8.97×10^{-04}	1.89×10^{-02}	3.22×10^{-02}
BENZO(B)FLUORANTHENE	5.59×10^{-03}	6.83×10^{-04}	4.52×10^{-04}	9.51×10^{-03}	1.62×10^{-02}
BENZO(E)PYRENE	4.10×10^{-02}	5.01×10^{-03}	3.32×10^{-03}	6.97×10^{-02}	1.19×10^{-01}
BENZO(G,H,I,)PERYLENE	5.33×10^{-03}	6.51×10^{-04}	4.31×10^{-04}	9.06×10^{-03}	1.55×10^{-02}
BENZO(K)FLUORANTHENE	4.37×10^{-03}	5.34×10^{-04}	3.54×10^{-04}	7.44×10^{-03}	1.27×10^{-02}
BENZOIC ACID	1.44×10^{-02}	1.76×10^{-03}	1.17×10^{-03}	2.45×10^{-02}	4.19×10^{-02}
BENZYL CHLORIDE	1.51×10^{-01}	1.85×10^{-02}	1.22×10^{-02}	2.57×10^{-01}	4.40×10^{-01}
BETA-PINENE	8.28×10^{-02}	1.01×10^{-02}	6.70×10^{-03}	1.41×10^{-01}	2.41×10^{-01}
BIPHENYL	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
B-PHELLANDRENE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
BROMODINITROBENZENE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
BUTOXYBUTENE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
BUTOXYETHOXYETHANOL ACETATE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
BUTYL ACRYLATE	1.55×10^{-01}	1.89×10^{-02}	1.25×10^{-02}	2.64×10^{-01}	4.50×10^{-01}
BUTYL BENZOATE	7.56×10^{-02}	9.24×10^{-03}	6.12×10^{-03}	1.29×10^{-01}	2.20×10^{-01}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
BUTYL CARBITOL	1.40×10^{-01}	1.72×10^{-02}	1.14×10^{-02}	2.39×10^{-01}	4.08×10^{-01}
BUTYL CELLOSOLVE	1.58×10^{-01}	1.94×10^{-02}	1.28×10^{-02}	2.70×10^{-01}	4.60×10^{-01}
BUTYLCYCLOHEXANE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
BUTYLISOPROPYLPHTHALATE	1.80×10^{-02}	2.20×10^{-03}	1.46×10^{-03}	3.07×10^{-02}	5.23×10^{-02}
BUTYRALDEHYDE	1.58×10^{-01}	1.94×10^{-02}	1.28×10^{-02}	2.70×10^{-01}	4.60×10^{-01}
C10 AROMATIC	6.56	8.02×10^{-01}	5.31×10^{-01}	$1.12 \times 10^{+01}$	$1.91 \times 10^{+01}$
C10 OLEFINS	1.08×10^{-02}	1.32×10^{-03}	8.74×10^{-04}	1.84×10^{-02}	3.14×10^{-02}
C10 PARAFFINS	4.71×10^{-01}	5.75×10^{-02}	3.81×10^{-02}	8.01×10^{-01}	1.37
C2 ALKYL INDAN	1.44×10^{-02}	1.76×10^{-03}	1.17×10^{-03}	2.45×10^{-02}	4.19×10^{-02}
C2 CYCLOHEXANE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
C3 CYCLOHEXANE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
C3/C4/C5 ALKYLBENZENES	1.08×10^{-02}	1.32×10^{-03}	8.74×10^{-04}	1.84×10^{-02}	3.14×10^{-02}
C-3-HEXENE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
C4 SUBSTITUTED CYCLOHEXANE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
C4 SUBSTITUTED CYCLOHEXANONE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
C5 ESTER	7.20×10^{-03}	8.80×10^{-04}	5.83×10^{-04}	1.23×10^{-02}	2.09×10^{-02}
C5 OLEFIN	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
C5 PARAFFIN	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
C5 SUBSTITUTED CYCLOHEXANE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
C6 SUBSTITUTED CYCLOHEXANE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
C6H18O3SI3	3.24×10^{-02}	3.96×10^{-03}	2.62×10^{-03}	5.52×10^{-02}	9.42×10^{-02}
C-7 CYCLOPARAFFINS	2.56×10^{-01}	3.13×10^{-02}	2.07×10^{-02}	4.35×10^{-01}	7.43×10^{-01}
C7-C16 PARAFFINS	5.40×10^{-02}	6.60×10^{-03}	4.37×10^{-03}	9.20×10^{-02}	1.57×10^{-01}
C-8 CYCLOPARAFFINS	1.80×10^{-02}	2.20×10^{-03}	1.46×10^{-03}	3.07×10^{-02}	5.23×10^{-02}
C8 PARAFFIN	7.20×10^{-03}	8.80×10^{-04}	5.83×10^{-04}	1.23×10^{-02}	2.09×10^{-02}
C8H24O4SI4	1.08×10^{-02}	1.32×10^{-03}	8.74×10^{-04}	1.84×10^{-02}	3.14×10^{-02}
CAMPHENE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
CARBITOL	1.66×10^{-01}	2.02×10^{-02}	1.34×10^{-02}	2.82×10^{-01}	4.81×10^{-01}
CARBON MONOXIDE	$1.38 \times 10^{+03}$	$1.69 \times 10^{+02}$	$1.12 \times 10^{+02}$	$2.35 \times 10^{+03}$	$4.02 \times 10^{+03}$
CARBON SULFIDE	3.24×10^{-02}	3.96×10^{-03}	2.62×10^{-03}	5.52×10^{-02}	9.42×10^{-02}
CARBON TETRACHLORIDE	2.34×10^{-01}	2.86×10^{-02}	1.89×10^{-02}	3.98×10^{-01}	6.80×10^{-01}
CARBONYL SULFIDE	1.08×10^{-02}	1.32×10^{-03}	8.74×10^{-04}	1.84×10^{-02}	3.14×10^{-02}
CELLOSOLVE	1.30×10^{-01}	1.58×10^{-02}	1.05×10^{-02}	2.21×10^{-01}	3.77×10^{-01}
CELLOSOLVE ACETATE	1.30×10^{-01}	1.58×10^{-02}	1.05×10^{-02}	2.21×10^{-01}	3.77×10^{-01}
CHLOROBENZENE	2.56×10^{-01}	3.13×10^{-02}	2.07×10^{-02}	4.35×10^{-01}	7.43×10^{-01}
CHLORODIFLUOROMETHANE	5.76×10^{-02}	7.04×10^{-03}	4.66×10^{-03}	9.81×10^{-02}	1.67×10^{-01}
CHLOROFORM	1.84×10^{-01}	2.25×10^{-02}	1.49×10^{-02}	3.13×10^{-01}	5.34×10^{-01}
CHLOROPENTAFLUOROETHANE	7.20×10^{-03}	8.80×10^{-04}	5.83×10^{-04}	1.23×10^{-02}	2.09×10^{-02}
CHLOROPRENE	1.22×10^{-01}	1.50×10^{-02}	9.91×10^{-03}	2.08×10^{-01}	3.56×10^{-01}
CHLOROTRIFLUOROMETHANE	1.80×10^{-02}	2.20×10^{-03}	1.46×10^{-03}	3.07×10^{-02}	5.23×10^{-02}
CHROMIUM (III) COMPOUNDS	1.41×10^{-02}	1.72×10^{-03}	1.14×10^{-03}	2.40×10^{-02}	4.09×10^{-02}
CHROMIUM (VI) COMPOUNDS	5.87×10^{-03}	7.17×10^{-04}	4.75×10^{-04}	9.99×10^{-03}	1.71×10^{-02}
CHRYSENE	5.06×10^{-03}	6.19×10^{-04}	4.10×10^{-04}	8.61×10^{-03}	1.47×10^{-02}
CIS-2-BUTENE	1.14	1.39×10^{-01}	9.22×10^{-02}	1.94	3.31

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
CIS-2-PENTENE	4.95×10^{-01}	6.05×10^{-02}	4.01×10^{-02}	8.43×10^{-01}	1.44
COBALT AND COMPOUNDS	2.00×10^{-02}	2.44×10^{-03}	1.62×10^{-03}	3.40×10^{-02}	5.80×10^{-02}
COPPER AND COMPOUNDS	2.00×10^{-02}	2.44×10^{-03}	1.62×10^{-03}	3.40×10^{-02}	5.80×10^{-02}
CORONENE	1.07×10^{-03}	1.31×10^{-04}	8.67×10^{-05}	1.82×10^{-03}	3.11×10^{-03}
CREOSOTE	1.33×10^{-01}	1.63×10^{-02}	1.08×10^{-02}	2.27×10^{-01}	3.87×10^{-01}
CRESOL	1.37×10^{-01}	1.67×10^{-02}	1.11×10^{-02}	2.33×10^{-01}	3.98×10^{-01}
CROTONALDEHYDE	1.73×10^{-01}	2.12×10^{-02}	1.40×10^{-02}	2.95×10^{-01}	5.04×10^{-01}
CYCLOHEXANE	4.01	4.90×10^{-01}	3.25×10^{-01}	6.83	$1.17 \times 10^{+01}$
CYCLOHEXANOL	1.62×10^{-01}	1.98×10^{-02}	1.31×10^{-02}	2.76×10^{-01}	4.71×10^{-01}
CYCLOHEXANONE	1.91×10^{-01}	2.33×10^{-02}	1.54×10^{-02}	3.25×10^{-01}	5.55×10^{-01}
CYCLOHEXENE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
CYCLOPENTA(C,D)PYRENE	1.21×10^{-02}	1.48×10^{-03}	9.77×10^{-04}	2.05×10^{-02}	3.51×10^{-02}
CYCLOPENTANE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
CYCLOPENTENE	6.69×10^{-01}	8.17×10^{-02}	5.41×10^{-02}	1.14	1.94
DENATURANT	3.60×10^{-02}	4.40×10^{-03}	2.91×10^{-03}	6.13×10^{-02}	1.05×10^{-01}
DIBENZO(A,H)ANTHRACENE	5.93×10^{-03}	7.25×10^{-04}	4.80×10^{-04}	1.01×10^{-02}	1.72×10^{-02}
DIBUTYL PHTHALATE	1.44×10^{-02}	1.76×10^{-03}	1.17×10^{-03}	2.45×10^{-02}	4.19×10^{-02}
DICHLOROBENZENES	7.20×10^{-03}	8.80×10^{-04}	5.83×10^{-04}	1.23×10^{-02}	2.09×10^{-02}
DICHLORODIFLUOROMETHANE	1.26×10^{-01}	1.54×10^{-02}	1.02×10^{-02}	2.15×10^{-01}	3.66×10^{-01}
DICHLOROMETHANE	2.70×10^{-01}	3.30×10^{-02}	2.19×10^{-02}	4.60×10^{-01}	7.85×10^{-01}
DICHLOROTETRAFLUORETHANE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
DIETHYLCYCLOHEXANE	1.08×10^{-02}	1.32×10^{-03}	8.74×10^{-04}	1.84×10^{-02}	3.14×10^{-02}
DIETHYLENE GLYCOL	1.58×10^{-01}	1.94×10^{-02}	1.28×10^{-02}	2.70×10^{-01}	4.60×10^{-01}
DIISOPROPYL BENZENE	1.37×10^{-01}	1.67×10^{-02}	1.11×10^{-02}	2.33×10^{-01}	3.98×10^{-01}
DIMETHYL FORMAMIDE	1.30×10^{-01}	1.58×10^{-02}	1.05×10^{-02}	2.21×10^{-01}	3.77×10^{-01}
DIMETHYL PHTHALATE	2.16×10^{-02}	2.64×10^{-03}	1.75×10^{-03}	3.68×10^{-02}	6.28×10^{-02}
DIMETHYLCYCLOHEXANE	1.80×10^{-02}	2.20×10^{-03}	1.46×10^{-03}	3.07×10^{-02}	5.23×10^{-02}
DIMETHYLCYCLOPENTANE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
DIMETHYLETHER	4.03×10^{-01}	4.93×10^{-02}	3.26×10^{-02}	6.87×10^{-01}	1.17
DIMETHYLHEXENE	3.22×10^{-01}	3.94×10^{-02}	2.61×10^{-02}	5.48×10^{-01}	9.35×10^{-01}
DIMETHYLOCTANES	1.08×10^{-02}	1.32×10^{-03}	8.74×10^{-04}	1.84×10^{-02}	3.14×10^{-02}
DIPROPYLENE GLYCOL	2.38×10^{-01}	2.91×10^{-02}	1.92×10^{-02}	4.05×10^{-01}	6.91×10^{-01}
D-LIMONENE	1.80×10^{-02}	2.20×10^{-03}	1.46×10^{-03}	3.07×10^{-02}	5.23×10^{-02}
DODECENE	1.80×10^{-01}	2.20×10^{-02}	1.46×10^{-02}	3.07×10^{-01}	5.23×10^{-01}
EPICHLOROHYDRIN	1.51×10^{-01}	1.85×10^{-02}	1.22×10^{-02}	2.57×10^{-01}	4.40×10^{-01}
ETHANE	4.43	5.42×10^{-01}	3.59×10^{-01}	7.55	$1.29 \times 10^{+01}$
ETHANOLAMINE	1.58×10^{-01}	1.94×10^{-02}	1.28×10^{-02}	2.70×10^{-01}	4.60×10^{-01}
ETHYL ACETATE	1.58×10^{-01}	1.94×10^{-02}	1.28×10^{-02}	2.70×10^{-01}	4.60×10^{-01}
ETHYL ACRYLATE	1.80×10^{-01}	2.20×10^{-02}	1.46×10^{-02}	3.07×10^{-01}	5.23×10^{-01}
ETHYL ALCOHOL	4.90×10^{-01}	5.99×10^{-02}	3.96×10^{-02}	8.34×10^{-01}	1.42
ETHYL CHLORIDE	1.04×10^{-01}	1.28×10^{-02}	8.45×10^{-03}	1.78×10^{-01}	3.03×10^{-01}
ETHYL ETHER	2.23×10^{-01}	2.73×10^{-02}	1.81×10^{-02}	3.80×10^{-01}	6.49×10^{-01}
ETHYL MERCAPTAN	1.19×10^{-01}	1.45×10^{-02}	9.62×10^{-03}	2.02×10^{-01}	3.45×10^{-01}
ETHYL STYRENE	1.08×10^{-02}	1.32×10^{-03}	8.74×10^{-04}	1.84×10^{-02}	3.14×10^{-02}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
ETHYLBENZENE	7.55	9.23×10^{-01}	6.11×10^{-01}	$1.29 \times 10^{+01}$	$2.19 \times 10^{+01}$
ETHYLCYCLOHEXANE	7.20×10^{-03}	8.80×10^{-04}	5.83×10^{-04}	1.23×10^{-02}	2.09×10^{-02}
ETHYLCYCLOPENTANE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
ETHYLENE	$2.08 \times 10^{+01}$	2.55	1.69	$3.55 \times 10^{+01}$	$6.05 \times 10^{+01}$
ETHYLENE DIBROMIDE	1.51×10^{-01}	1.85×10^{-02}	1.22×10^{-02}	2.57×10^{-01}	4.40×10^{-01}
ETHYLENE DICHLORIDE	2.09×10^{-01}	2.55×10^{-02}	1.69×10^{-02}	3.56×10^{-01}	6.07×10^{-01}
ETHYLENE GLYCOL	1.33×10^{-01}	1.63×10^{-02}	1.08×10^{-02}	2.27×10^{-01}	3.87×10^{-01}
ETHYLENE OXIDE	1.37×10^{-01}	1.67×10^{-02}	1.11×10^{-02}	2.33×10^{-01}	3.98×10^{-01}
ETHYLENEAMINES	1.58×10^{-01}	1.94×10^{-02}	1.28×10^{-02}	2.70×10^{-01}	4.60×10^{-01}
ETHYLHEPTENE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
ETHYLHEXANE	7.20×10^{-03}	8.80×10^{-04}	5.83×10^{-04}	1.23×10^{-02}	2.09×10^{-02}
ETHYLISOPROPYL ETHER	7.20×10^{-03}	8.80×10^{-04}	5.83×10^{-04}	1.23×10^{-02}	2.09×10^{-02}
ETHYLMETHYLCYCLOHEXANES	7.20×10^{-03}	8.80×10^{-04}	5.83×10^{-04}	1.23×10^{-02}	2.09×10^{-02}
ETHYL-PHENYL-PHENYL-ETHANE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
ETHYLTOLUENE	7.20×10^{-03}	8.80×10^{-04}	5.83×10^{-04}	1.23×10^{-02}	2.09×10^{-02}
FLUORANTHENE	2.67×10^{-02}	3.26×10^{-03}	2.16×10^{-03}	4.54×10^{-02}	7.76×10^{-02}
FLUORENE	3.81×10^{-02}	4.66×10^{-03}	3.09×10^{-03}	6.49×10^{-02}	1.11×10^{-01}
FORMALDEHYDE	8.00×10^{-01}	9.78×10^{-02}	6.47×10^{-02}	1.36	2.32
FORMIC ACID	1.51×10^{-01}	1.85×10^{-02}	1.22×10^{-02}	2.57×10^{-01}	4.40×10^{-01}
GLYOXAL	7.20×10^{-03}	8.80×10^{-04}	5.83×10^{-04}	1.23×10^{-02}	2.09×10^{-02}
HEPTENE	1.84×10^{-01}	2.25×10^{-02}	1.49×10^{-02}	3.13×10^{-01}	5.34×10^{-01}
HEXADECANE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
HEXAFLUOROETHANE	1.44×10^{-01}	1.76×10^{-02}	1.17×10^{-02}	2.45×10^{-01}	4.19×10^{-01}
HEXAMETHYLENEDIAMINE	2.41×10^{-01}	2.95×10^{-02}	1.95×10^{-02}	4.11×10^{-01}	7.01×10^{-01}
HEXYLENE GLYCOL	1.30×10^{-01}	1.58×10^{-02}	1.05×10^{-02}	2.21×10^{-01}	3.77×10^{-01}
INDANE	1.34	1.63×10^{-01}	1.08×10^{-01}	2.28	3.89
INDENO(1,2,3-C,D)PYRENE	1.40×10^{-03}	1.71×10^{-04}	1.13×10^{-04}	2.38×10^{-03}	4.06×10^{-03}
ISOBUTANE	1.54	1.88×10^{-01}	1.24×10^{-01}	2.61	4.46
ISOBUTYL ACRYLATE	1.37×10^{-01}	1.67×10^{-02}	1.11×10^{-02}	2.33×10^{-01}	3.98×10^{-01}
ISOBUTYL ALCOHOL	1.51×10^{-01}	1.85×10^{-02}	1.22×10^{-02}	2.57×10^{-01}	4.40×10^{-01}
ISOBUTYL ISOBUTYRATE	1.40×10^{-01}	1.72×10^{-02}	1.14×10^{-02}	2.39×10^{-01}	4.08×10^{-01}
ISOBUTYLBENZENE	1.21	1.48×10^{-01}	9.82×10^{-02}	2.07	3.53
ISOBUTYLENE	3.49	4.27×10^{-01}	2.83×10^{-01}	5.94	$1.01 \times 10^{+01}$
ISOBUTYRALDEHYDE	1.51×10^{-01}	1.85×10^{-02}	1.22×10^{-02}	2.57×10^{-01}	4.40×10^{-01}
ISOMERS OF BUTENE	1.80×10^{-02}	2.20×10^{-03}	1.46×10^{-03}	3.07×10^{-02}	5.23×10^{-02}
ISOMERS OF BUTYLBENZENE	2.16×10^{-02}	2.64×10^{-03}	1.75×10^{-03}	3.68×10^{-02}	6.28×10^{-02}
ISOMERS OF C10H18	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
ISOMERS OF DECANE	1.44×10^{-01}	1.76×10^{-02}	1.17×10^{-02}	2.45×10^{-01}	4.19×10^{-01}
ISOMERS OF DIETHYLBENZENE	1.08×10^{-02}	1.32×10^{-03}	8.74×10^{-04}	1.84×10^{-02}	3.14×10^{-02}
ISOMERS OF DODECANE	1.66×10^{-01}	2.02×10^{-02}	1.34×10^{-02}	2.82×10^{-01}	4.81×10^{-01}
ISOMERS OF ETHYLTOLUENE	1.44×10^{-02}	1.76×10^{-03}	1.17×10^{-03}	2.45×10^{-02}	4.19×10^{-02}
ISOMERS OF HEPTADECANE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
ISOMERS OF HEPTANE	9.01×10^{-02}	1.10×10^{-02}	7.29×10^{-03}	1.53×10^{-01}	2.62×10^{-01}
ISOMERS OF HEXANE	1.95×10^{-01}	2.38×10^{-02}	1.57×10^{-02}	3.31×10^{-01}	5.65×10^{-01}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
ISOMERS OF NONANE	6.84×10^{-02}	8.36×10^{-03}	5.54×10^{-03}	1.16×10^{-01}	1.99×10^{-01}
ISOMERS OF OCTADECANE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
ISOMERS OF OCTANE	5.40×10^{-02}	6.60×10^{-03}	4.37×10^{-03}	9.20×10^{-02}	1.57×10^{-01}
ISOMERS OF PENTADECANE	1.51×10^{-01}	1.85×10^{-02}	1.22×10^{-02}	2.57×10^{-01}	4.40×10^{-01}
ISOMERS OF PENTANE	4.00×10^{-01}	4.89×10^{-02}	3.24×10^{-02}	6.80×10^{-01}	1.16
ISOMERS OF PENTENE	1.80×10^{-02}	2.20×10^{-03}	1.46×10^{-03}	3.07×10^{-02}	5.23×10^{-02}
ISOMERS OF PROPYLBENZENE	7.20×10^{-03}	8.80×10^{-04}	5.83×10^{-04}	1.23×10^{-02}	2.09×10^{-02}
ISOMERS OF TETRADECANE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
ISOMERS OF UNDECANE	1.80×10^{-02}	2.20×10^{-03}	1.46×10^{-03}	3.07×10^{-02}	5.23×10^{-02}
ISOMERS OF XYLENE	$3.39 \times 10^{+01}$	4.14	2.74	$5.77 \times 10^{+01}$	$9.84 \times 10^{+01}$
ISOPENTANE	8.69	1.06	7.03×10^{-01}	$1.48 \times 10^{+01}$	$2.53 \times 10^{+01}$
ISOPRENE	4.21×10^{-01}	5.15×10^{-02}	3.41×10^{-02}	7.17×10^{-01}	1.22
ISOPROPYL ACETATE	1.69×10^{-01}	2.07×10^{-02}	1.37×10^{-02}	2.88×10^{-01}	4.92×10^{-01}
ISOPROPYL ALCOHOL	2.63×10^{-01}	3.21×10^{-02}	2.13×10^{-02}	4.48×10^{-01}	7.64×10^{-01}
ISOPROPYLBENZENE	1.37×10^{-01}	1.67×10^{-02}	1.11×10^{-02}	2.33×10^{-01}	3.98×10^{-01}
LACTOL SPIRITS	1.30×10^{-01}	1.58×10^{-02}	1.05×10^{-02}	2.21×10^{-01}	3.77×10^{-01}
MALEIC ANHYDRIDE	2.52×10^{-02}	3.08×10^{-03}	2.04×10^{-03}	4.29×10^{-02}	7.33×10^{-02}
MANGANESE AND COMPOUNDS	2.00×10^{-02}	2.44×10^{-03}	1.62×10^{-03}	3.40×10^{-02}	5.80×10^{-02}
M-DIETHYLBENZENE	1.41	1.73×10^{-01}	1.14×10^{-01}	2.40	4.10
METHANE	$2.72 \times 10^{+01}$	3.32	2.20	$4.62 \times 10^{+01}$	$7.89 \times 10^{+01}$
METHYL ACETATE	2.56×10^{-01}	3.13×10^{-02}	2.07×10^{-02}	4.35×10^{-01}	7.43×10^{-01}
METHYL ACRYLATE	1.37×10^{-01}	1.67×10^{-02}	1.11×10^{-02}	2.33×10^{-01}	3.98×10^{-01}
METHYL ALCOHOL	5.04×10^{-01}	6.16×10^{-02}	4.08×10^{-02}	8.58×10^{-01}	1.47
METHYL AMYL KETONE	1.84×10^{-01}	2.25×10^{-02}	1.49×10^{-02}	3.13×10^{-01}	5.34×10^{-01}
METHYL CARBITOL	1.40×10^{-01}	1.72×10^{-02}	1.14×10^{-02}	2.39×10^{-01}	4.08×10^{-01}
METHYL CELLOSOLVE	1.40×10^{-01}	1.72×10^{-02}	1.14×10^{-02}	2.39×10^{-01}	4.08×10^{-01}
METHYL ETHYL KETONE	4.39×10^{-01}	5.37×10^{-02}	3.56×10^{-02}	7.48×10^{-01}	1.28
METHYL FORMATE	7.56×10^{-02}	9.24×10^{-03}	6.12×10^{-03}	1.29×10^{-01}	2.20×10^{-01}
METHYL GLYOXAL	7.20×10^{-03}	8.80×10^{-04}	5.83×10^{-04}	1.23×10^{-02}	2.09×10^{-02}
METHYL ISOBUTYL KETONE	2.02×10^{-01}	2.47×10^{-02}	1.63×10^{-02}	3.43×10^{-01}	5.86×10^{-01}
METHYL METHACRYLATE	1.66×10^{-01}	2.02×10^{-02}	1.34×10^{-02}	2.82×10^{-01}	4.81×10^{-01}
METHYL MYRISTATE	1.08×10^{-02}	1.32×10^{-03}	8.74×10^{-04}	1.84×10^{-02}	3.14×10^{-02}
METHYL NAPHTHALENES	1.44×10^{-02}	1.76×10^{-03}	1.17×10^{-03}	2.45×10^{-02}	4.19×10^{-02}
METHYL PALMITATE	2.88×10^{-02}	3.52×10^{-03}	2.33×10^{-03}	4.90×10^{-02}	8.37×10^{-02}
METHYL STEARATE	3.96×10^{-02}	4.84×10^{-03}	3.21×10^{-03}	6.74×10^{-02}	1.15×10^{-01}
METHYL STYRENE	1.48×10^{-01}	1.80×10^{-02}	1.20×10^{-02}	2.51×10^{-01}	4.29×10^{-01}
METHYL TERT-BUTYL ETHER	$3.91 \times 10^{+01}$	4.78	3.16	$6.66 \times 10^{+01}$	$1.14 \times 10^{+02}$
METHYLACETYLENE	4.21×10^{-01}	5.15×10^{-02}	3.41×10^{-02}	7.17×10^{-01}	1.22
METHYLAL	6.12×10^{-02}	7.48×10^{-03}	4.96×10^{-03}	1.04×10^{-01}	1.78×10^{-01}
METHYLALLENE	1.44×10^{-01}	1.76×10^{-02}	1.17×10^{-02}	2.45×10^{-01}	4.19×10^{-01}
METHYLCYCLOHEXANE	1.16	1.42×10^{-01}	9.42×10^{-02}	1.98	3.38
METHYLCYCLOPENTANE	1.51	1.85×10^{-01}	1.22×10^{-01}	2.57	4.39
METHYLCYCLOPENTENE	4.95×10^{-02}	6.05×10^{-03}	4.01×10^{-03}	8.43×10^{-02}	1.44×10^{-01}
METHYLDECANES	7.20×10^{-03}	8.80×10^{-04}	5.83×10^{-04}	1.23×10^{-02}	2.09×10^{-02}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
METHYLENE BROMIDE	1.08×10^{-02}	1.32×10^{-03}	8.74×10^{-04}	1.84×10^{-02}	3.14×10^{-02}
METHYLHEXANE	1.08×10^{-02}	1.32×10^{-03}	8.74×10^{-04}	1.84×10^{-02}	3.14×10^{-02}
METHYLNONANE	7.20×10^{-03}	8.80×10^{-04}	5.83×10^{-04}	1.23×10^{-02}	2.09×10^{-02}
METHYLOCTANES	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
METHYLPENTANE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
METHYLPROPYLCYCLOHEXANES	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
M-ETHYLTOLUENE	3.10	3.78×10^{-01}	2.51×10^{-01}	5.27	8.99
METHYLUNDECANE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
MINERAL SPIRITS	2.31×10^{-01}	2.82×10^{-02}	1.87×10^{-02}	3.92×10^{-01}	6.70×10^{-01}
MYRCENE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
NAPHTHA	1.69×10^{-01}	2.07×10^{-02}	1.37×10^{-02}	2.88×10^{-01}	4.92×10^{-01}
NAPHTHALENE	4.38×10^{-01}	5.36×10^{-02}	3.55×10^{-02}	7.46×10^{-01}	1.27
N-BUTANE	9.44	1.15	7.64×10^{-01}	$1.61 \times 10^{+01}$	$2.74 \times 10^{+01}$
N-BUTYL ACETATE	2.09×10^{-01}	2.55×10^{-02}	1.69×10^{-02}	3.56×10^{-01}	6.07×10^{-01}
N-BUTYL ALCOHOL	2.49×10^{-01}	3.04×10^{-02}	2.01×10^{-02}	4.23×10^{-01}	7.22×10^{-01}
N-DECANE	4.95×10^{-01}	6.05×10^{-02}	4.01×10^{-02}	8.43×10^{-01}	1.44
N-DODECANE	6.84×10^{-02}	8.36×10^{-03}	5.54×10^{-03}	1.16×10^{-01}	1.99×10^{-01}
N-HEPTANE	1.31	1.60×10^{-01}	1.06×10^{-01}	2.23	3.81
N-HEXANE	6.12	7.48×10^{-01}	4.95×10^{-01}	$1.04 \times 10^{+01}$	$1.78 \times 10^{+01}$
NICKEL AND COMPOUNDS	2.00×10^{-02}	2.44×10^{-03}	1.62×10^{-03}	3.40×10^{-02}	5.80×10^{-02}
NITRIC OXIDE	$1.41 \times 10^{+01}$	1.72	1.14	$2.40 \times 10^{+01}$	$4.09 \times 10^{+01}$
NITROBENZENE	1.19×10^{-01}	1.45×10^{-02}	9.62×10^{-03}	2.02×10^{-01}	3.45×10^{-01}
NITROGEN DIOXIDE	1.14	1.39×10^{-01}	9.19×10^{-02}	1.93	3.30
N-NONANE	6.19×10^{-01}	7.57×10^{-02}	5.01×10^{-02}	1.05	1.80
N-OCTANE	7.43×10^{-01}	9.08×10^{-02}	6.01×10^{-02}	1.26	2.16
NONENONE	7.20×10^{-03}	8.80×10^{-04}	5.83×10^{-04}	1.23×10^{-02}	2.09×10^{-02}
N-PENTADECANE	6.12×10^{-02}	7.48×10^{-03}	4.96×10^{-03}	1.04×10^{-01}	1.78×10^{-01}
N-PENTANE	3.96	4.84×10^{-01}	3.21×10^{-01}	6.74	$1.15 \times 10^{+01}$
N-PENTYLCYCLOHEXANE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
N-PROPYL ACETATE	1.76×10^{-01}	2.16×10^{-02}	1.43×10^{-02}	3.00×10^{-01}	5.13×10^{-01}
N-PROPYL ALCOHOL	1.51×10^{-01}	1.85×10^{-02}	1.22×10^{-02}	2.57×10^{-01}	4.40×10^{-01}
N-PROPYLBENZENE	1.39	1.70×10^{-01}	1.12×10^{-01}	2.36	4.03
N-TETRADECANE	2.52×10^{-02}	3.08×10^{-03}	2.04×10^{-03}	4.29×10^{-02}	7.33×10^{-02}
N-TRIDECANE	3.60×10^{-02}	4.40×10^{-03}	2.91×10^{-03}	6.13×10^{-02}	1.05×10^{-01}
N-UNDECANE	1.49	1.82×10^{-01}	1.20×10^{-01}	2.53	4.32
OCTAMETHYLCYCLOTETRASILOXANE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
O-DICHLOROBENZENE	1.44×10^{-01}	1.76×10^{-02}	1.17×10^{-02}	2.45×10^{-01}	4.19×10^{-01}
O-ETHYLTOLUENE	6.44×10^{-01}	7.87×10^{-02}	5.21×10^{-02}	1.10	1.87
OXIDES OF NITROGEN	$2.27 \times 10^{+01}$	2.78	1.84	$3.87 \times 10^{+01}$	$6.60 \times 10^{+01}$
PALMITIC ACID	7.20×10^{-02}	8.80×10^{-03}	5.83×10^{-03}	1.23×10^{-01}	2.09×10^{-01}
PARAFFINS (C16-C34)	7.20×10^{-03}	8.80×10^{-04}	5.83×10^{-04}	1.23×10^{-02}	2.09×10^{-02}
PARTICULATE MATTER < 10 µm	$3.99 \times 10^{+01}$	4.88	3.23	$6.80 \times 10^{+01}$	$1.16 \times 10^{+02}$
PARTICULATE MATTER < 2.5 µm	$3.67 \times 10^{+01}$	4.49	2.97	$6.25 \times 10^{+01}$	$1.07 \times 10^{+02}$
P-DICHLOROBENZENE	2.59×10^{-01}	3.17×10^{-02}	2.10×10^{-02}	4.41×10^{-01}	7.53×10^{-01}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
PHENANTHRENE	3.49×10^{-02}	4.26×10^{-03}	2.82×10^{-03}	5.94×10^{-02}	1.01×10^{-01}
PHENOL	1.58×10^{-01}	1.94×10^{-02}	1.28×10^{-02}	2.70×10^{-01}	4.60×10^{-01}
PHENYL ISOCYANATE	4.32×10^{-02}	5.28×10^{-03}	3.50×10^{-03}	7.36×10^{-02}	1.26×10^{-01}
PHTHALIC ANHYDRIDE	7.20×10^{-02}	8.80×10^{-03}	5.83×10^{-03}	1.23×10^{-01}	2.09×10^{-01}
PIPERYLENE	1.44×10^{-01}	1.76×10^{-02}	1.17×10^{-02}	2.45×10^{-01}	4.19×10^{-01}
POLYCHLORINATED DIOXINS AND FURANS	1.16×10^{-11}	1.42×10^{-12}	9.38×10^{-13}	1.97×10^{-11}	3.37×10^{-11}
POLYCYCLIC AROMATIC HYDROCARBONS	7.42×10^{-01}	9.07×10^{-02}	6.00×10^{-02}	1.26	2.16
PROPADIENE	3.22×10^{-01}	3.94×10^{-02}	2.61×10^{-02}	5.48×10^{-01}	9.35×10^{-01}
PROPANE	8.64×10^{-01}	1.06×10^{-01}	7.00×10^{-02}	1.47	2.51
PROPIONALDEHYDE	2.02×10^{-01}	2.46×10^{-02}	1.63×10^{-02}	3.43×10^{-01}	5.86×10^{-01}
PROPIONIC ACID	1.44×10^{-01}	1.76×10^{-02}	1.17×10^{-02}	2.45×10^{-01}	4.19×10^{-01}
PROPYLCYCLOHEXANE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
PROPYLENE	7.13	8.72×10^{-01}	5.77×10^{-01}	$1.21 \times 10^{+01}$	$2.07 \times 10^{+01}$
PROPYLENE DICHLORIDE	7.20×10^{-03}	8.80×10^{-04}	5.83×10^{-04}	1.23×10^{-02}	2.09×10^{-02}
PROPYLENE GLYCOL	1.37×10^{-01}	1.67×10^{-02}	1.11×10^{-02}	2.33×10^{-01}	3.98×10^{-01}
PROPYLENE OXIDE	1.80×10^{-01}	2.20×10^{-02}	1.46×10^{-02}	3.07×10^{-01}	5.23×10^{-01}
PYRENE	5.18×10^{-02}	6.33×10^{-03}	4.19×10^{-03}	8.81×10^{-02}	1.50×10^{-01}
RETENE	1.47×10^{-02}	1.79×10^{-03}	1.19×10^{-03}	2.49×10^{-02}	4.26×10^{-02}
S-BUTYL ALCOHOL	1.22×10^{-01}	1.50×10^{-02}	9.91×10^{-03}	2.08×10^{-01}	3.56×10^{-01}
S-BUTYLBENZENE	4.21×10^{-01}	5.15×10^{-02}	3.41×10^{-02}	7.17×10^{-01}	1.22
STYRENE	4.08×10^{-01}	4.99×10^{-02}	3.30×10^{-02}	6.95×10^{-01}	1.19
SUBSTITUTED C9 ESTER (C12)	3.24×10^{-02}	3.96×10^{-03}	2.62×10^{-03}	5.52×10^{-02}	9.42×10^{-02}
SULFUR DIOXIDE	8.07×10^{-01}	9.87×10^{-02}	6.53×10^{-02}	1.37	2.35
T-3-HEXENE	4.95×10^{-01}	6.05×10^{-02}	4.01×10^{-02}	8.43×10^{-01}	1.44
TERT-BUTYL ALCOHOL	1.51×10^{-01}	1.85×10^{-02}	1.22×10^{-02}	2.57×10^{-01}	4.40×10^{-01}
TETRACHLOROETHYLENE	2.52×10^{-01}	3.08×10^{-02}	2.04×10^{-02}	4.29×10^{-01}	7.33×10^{-01}
TETRAFLUOROMETHANE	1.08×10^{-02}	1.32×10^{-03}	8.74×10^{-04}	1.84×10^{-02}	3.14×10^{-02}
TOLUENE	$3.08 \times 10^{+01}$	3.77	2.49	$5.25 \times 10^{+01}$	$8.95 \times 10^{+01}$
TOLUENE DIISOCYANATE	2.38×10^{-01}	2.91×10^{-02}	1.92×10^{-02}	4.05×10^{-01}	6.91×10^{-01}
TOTAL AROMATIC AMINES	1.44×10^{-02}	1.76×10^{-03}	1.17×10^{-03}	2.45×10^{-02}	4.19×10^{-02}
TOTAL C2-C5 ALDEHYDES	4.32×10^{-02}	5.28×10^{-03}	3.50×10^{-03}	7.36×10^{-02}	1.26×10^{-01}
TOTAL SUSPENDED PARTICULATES	$4.20 \times 10^{+01}$	5.14	3.40	$7.15 \times 10^{+01}$	$1.22 \times 10^{+02}$
TOTAL VOCS	$3.15 \times 10^{+02}$	$3.85 \times 10^{+01}$	$2.55 \times 10^{+01}$	$5.36 \times 10^{+02}$	$9.16 \times 10^{+02}$
TRANS-2-BUTENE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
TRANS-2-PENTENE	8.42×10^{-01}	1.03×10^{-01}	6.81×10^{-02}	1.43	2.45
TRICHLOROBENZENES	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
TRICHLOROETHYLENE	1.55×10^{-01}	1.89×10^{-02}	1.25×10^{-02}	2.64×10^{-01}	4.50×10^{-01}
TRICHLOROFLUOROMETHANE	2.20×10^{-01}	2.69×10^{-02}	1.78×10^{-02}	3.74×10^{-01}	6.38×10^{-01}
TRICHLOROTRIFLUOROETHANE	1.44×10^{-01}	1.76×10^{-02}	1.17×10^{-02}	2.45×10^{-01}	4.19×10^{-01}
TRIFLUOROMETHANE	1.08×10^{-01}	1.32×10^{-02}	8.74×10^{-03}	1.84×10^{-01}	3.14×10^{-01}
TRIMETHYLBENZENE	3.96×10^{-02}	4.84×10^{-03}	3.21×10^{-03}	6.74×10^{-02}	1.15×10^{-01}
TRIMETHYLCYCLOHEXANES	7.20×10^{-03}	8.80×10^{-04}	5.83×10^{-04}	1.23×10^{-02}	2.09×10^{-02}
TRIMETHYLCYCLOPENTANE	3.60×10^{-03}	4.40×10^{-04}	2.91×10^{-04}	6.13×10^{-03}	1.05×10^{-02}
TRIMETHYLDECENE	7.20×10^{-03}	8.80×10^{-04}	5.83×10^{-04}	1.23×10^{-02}	2.09×10^{-02}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
TRIMETHYLFLUOROSILANE	2.49×10^{-01}	3.04×10^{-02}	2.01×10^{-02}	4.23×10^{-01}	7.22×10^{-01}
TRIMETHYLHEPTANES	7.20×10^{-03}	8.80×10^{-04}	5.83×10^{-04}	1.23×10^{-02}	2.09×10^{-02}
VINYL ACETATE	1.98×10^{-01}	2.42×10^{-02}	1.60×10^{-02}	3.37×10^{-01}	5.76×10^{-01}
VINYL CHLORIDE	1.51×10^{-01}	1.85×10^{-02}	1.22×10^{-02}	2.57×10^{-01}	4.40×10^{-01}
ZINC AND COMPOUNDS	2.00×10^{-02}	2.44×10^{-03}	1.62×10^{-03}	3.40×10^{-02}	5.80×10^{-02}

Table C1.6: Annual Emissions from Commercial Boats – 4-Stroke Petrol

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
1,1,1-TRICHLOROETHANE	1.07×10^{-03}	1.31×10^{-04}	8.67×10^{-05}	1.82×10^{-03}	3.11×10^{-03}
1,1,2-TRICHLOROETHANE	8.72×10^{-04}	1.07×10^{-04}	7.06×10^{-05}	1.48×10^{-03}	2.53×10^{-03}
1,2,3-TRIMETHYLBENZENE	1.39×10^{-02}	1.70×10^{-03}	1.12×10^{-03}	2.36×10^{-02}	4.03×10^{-02}
1,2,4-TRIMETHYLBENZENE	4.97×10^{-02}	6.07×10^{-03}	4.02×10^{-03}	8.46×10^{-02}	1.44×10^{-01}
1,2-DIETHYLBENZENE	1.15×10^{-02}	1.40×10^{-03}	9.29×10^{-04}	1.95×10^{-02}	3.34×10^{-02}
1,3,5-TRIMETHYLBENZENE	3.79×10^{-02}	4.63×10^{-03}	3.07×10^{-03}	6.45×10^{-02}	1.10×10^{-01}
1,3-BUTADIENE	1.98×10^{-02}	2.42×10^{-03}	1.60×10^{-03}	3.37×10^{-02}	5.75×10^{-02}
1,4-BUTANEDIOL	9.97×10^{-05}	1.22×10^{-05}	8.07×10^{-06}	1.70×10^{-04}	2.90×10^{-04}
1-BUTENE	9.97×10^{-04}	1.22×10^{-04}	8.07×10^{-05}	1.70×10^{-03}	2.90×10^{-03}
1-BUTYNE	4.99×10^{-05}	6.09×10^{-06}	4.03×10^{-06}	8.48×10^{-05}	1.45×10^{-04}
1-CHLOROBUTANE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
1-DECENE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
1-HEXENE	3.77×10^{-03}	4.61×10^{-04}	3.05×10^{-04}	6.42×10^{-03}	1.10×10^{-02}
1-METHYL-3-ISOPROPYLBENZENE	8.74×10^{-03}	1.07×10^{-03}	7.07×10^{-04}	1.49×10^{-02}	2.54×10^{-02}
1-METHYL-3-PROPYLBENZENE	6.68×10^{-03}	8.17×10^{-04}	5.41×10^{-04}	1.14×10^{-02}	1.94×10^{-02}
1-PENTENE	3.26×10^{-03}	3.98×10^{-04}	2.64×10^{-04}	5.54×10^{-03}	9.46×10^{-03}
2,2,4-TRIMETHYLPENTANE	4.00×10^{-02}	4.89×10^{-03}	3.24×10^{-03}	6.81×10^{-02}	1.16×10^{-01}
2,2,5-TRIMETHYLHEXANE	8.23×10^{-03}	1.01×10^{-03}	6.66×10^{-04}	1.40×10^{-02}	2.39×10^{-02}
2,2-DICHLORONITROANILINE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
2,2-DIMETHYLBUTANE	1.22×10^{-02}	1.49×10^{-03}	9.85×10^{-04}	2.07×10^{-02}	3.54×10^{-02}
2,2-DIMETHYLHEXANE	1.20×10^{-03}	1.47×10^{-04}	9.71×10^{-05}	2.04×10^{-03}	3.49×10^{-03}
2,3,3-TRIMETHYLPENTANE	1.89×10^{-02}	2.30×10^{-03}	1.53×10^{-03}	3.21×10^{-02}	5.48×10^{-02}
2,3,4-TRIMETHYLPENTANE	1.89×10^{-03}	2.30×10^{-04}	1.53×10^{-04}	3.21×10^{-03}	5.48×10^{-03}
2,3,5-TRIMETHYLHEXANE	1.89×10^{-03}	2.30×10^{-04}	1.53×10^{-04}	3.21×10^{-03}	5.48×10^{-03}
2,3-DIMETHYLBUTANE	9.08×10^{-03}	1.11×10^{-03}	7.35×10^{-04}	1.55×10^{-02}	2.64×10^{-02}
2,3-DIMETHYLPENTANE	2.14×10^{-02}	2.62×10^{-03}	1.73×10^{-03}	3.65×10^{-02}	6.22×10^{-02}
2,4,4-TRIMETHYL-1-PENTENE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
2,4,5-TRIMETHYLHEPTANE	7.71×10^{-03}	9.43×10^{-04}	6.24×10^{-04}	1.31×10^{-02}	2.24×10^{-02}
2,4-DIMETHYLHEPTANE	2.23×10^{-03}	2.72×10^{-04}	1.80×10^{-04}	3.79×10^{-03}	6.47×10^{-03}
2,4-DIMETHYLHEXANE	1.50×10^{-04}	1.83×10^{-05}	1.21×10^{-05}	2.55×10^{-04}	4.34×10^{-04}
2,4-DIMETHYLOCTANE	1.71×10^{-03}	2.09×10^{-04}	1.39×10^{-04}	2.92×10^{-03}	4.98×10^{-03}
2,4-DIMETHYLPENTANE	9.08×10^{-03}	1.11×10^{-03}	7.35×10^{-04}	1.55×10^{-02}	2.64×10^{-02}
2,5-DIMETHYLHEXANE	1.08×10^{-02}	1.32×10^{-03}	8.74×10^{-04}	1.84×10^{-02}	3.14×10^{-02}
2-BUTYNE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
2-FURFURAL	9.22×10^{-04}	1.13×10^{-04}	7.46×10^{-05}	1.57×10^{-03}	2.68×10^{-03}
2-HEXENE	1.37×10^{-03}	1.68×10^{-04}	1.11×10^{-04}	2.33×10^{-03}	3.98×10^{-03}
2-METHYL-1-BUTENE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
2-METHYL-2-BUTENE	8.74×10^{-03}	1.07×10^{-03}	7.07×10^{-04}	1.49×10^{-02}	2.54×10^{-02}
2-METHYL-2-PENTENE	3.94×10^{-03}	4.82×10^{-04}	3.19×10^{-04}	6.71×10^{-03}	1.15×10^{-02}
2-METHYL-3-HEXANONE	1.74×10^{-04}	2.13×10^{-05}	1.41×10^{-05}	2.97×10^{-04}	5.07×10^{-04}
2-METHYLDECANE	2.26×10^{-02}	2.76×10^{-03}	1.83×10^{-03}	3.85×10^{-02}	6.57×10^{-02}
2-METHYLHEPTANE	3.77×10^{-03}	4.61×10^{-04}	3.05×10^{-04}	6.42×10^{-03}	1.10×10^{-02}
2-METHYLOCTANE	3.43×10^{-04}	4.19×10^{-05}	2.77×10^{-05}	5.83×10^{-04}	9.96×10^{-04}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
2-METHYLPENTANE	2.18×10^{-02}	2.66×10^{-03}	1.76×10^{-03}	3.70×10^{-02}	6.32×10^{-02}
3,4-DIMETHYLOCTANE	1.65×10^{-02}	2.01×10^{-03}	1.33×10^{-03}	2.80×10^{-02}	4.78×10^{-02}
3-METHYL-1-BUTENE	3.09×10^{-03}	3.77×10^{-04}	2.50×10^{-04}	5.25×10^{-03}	8.96×10^{-03}
3-METHYLHEPTANE	6.17×10^{-03}	7.54×10^{-04}	4.99×10^{-04}	1.05×10^{-02}	1.79×10^{-02}
3-METHYLHEXANE	1.58×10^{-02}	1.93×10^{-03}	1.28×10^{-03}	2.68×10^{-02}	4.58×10^{-02}
3-METHYLPENTANE	1.47×10^{-02}	1.80×10^{-03}	1.19×10^{-03}	2.51×10^{-02}	4.28×10^{-02}
4-METHYL-1-PENTENE	4.28×10^{-03}	5.24×10^{-04}	3.47×10^{-04}	7.29×10^{-03}	1.24×10^{-02}
4-METHYLANILINE	7.48×10^{-05}	9.14×10^{-06}	6.05×10^{-06}	1.27×10^{-04}	2.17×10^{-04}
4-METHYLHEPTANE	8.91×10^{-03}	1.09×10^{-03}	7.21×10^{-04}	1.52×10^{-02}	2.59×10^{-02}
ACENAPHTHENE	4.17×10^{-04}	5.10×10^{-05}	3.38×10^{-05}	7.10×10^{-04}	1.21×10^{-03}
ACENAPHTHYLENE	2.12×10^{-03}	2.59×10^{-04}	1.72×10^{-04}	3.61×10^{-03}	6.16×10^{-03}
ACETALDEHYDE	8.53×10^{-03}	1.04×10^{-03}	6.90×10^{-04}	1.45×10^{-02}	2.48×10^{-02}
ACETIC ACID	1.82×10^{-03}	2.22×10^{-04}	1.47×10^{-04}	3.10×10^{-03}	5.29×10^{-03}
ACETIC ANHYDRIDE	8.72×10^{-04}	1.07×10^{-04}	7.06×10^{-05}	1.48×10^{-03}	2.53×10^{-03}
ACETONE	3.66×10^{-03}	4.48×10^{-04}	2.97×10^{-04}	6.24×10^{-03}	1.06×10^{-02}
ACETYLENE	3.86×10^{-02}	4.71×10^{-03}	3.12×10^{-03}	6.56×10^{-02}	1.12×10^{-01}
ACROLEIN	1.46×10^{-03}	1.78×10^{-04}	1.18×10^{-04}	2.48×10^{-03}	4.23×10^{-03}
ACRYLIC ACID	1.12×10^{-03}	1.37×10^{-04}	9.08×10^{-05}	1.91×10^{-03}	3.26×10^{-03}
ACRYLONITRILE	1.45×10^{-03}	1.77×10^{-04}	1.17×10^{-04}	2.46×10^{-03}	4.20×10^{-03}
ADIPIC ACID	9.97×10^{-04}	1.22×10^{-04}	8.07×10^{-05}	1.70×10^{-03}	2.90×10^{-03}
ALIPHATICS	2.49×10^{-04}	3.05×10^{-05}	2.02×10^{-05}	4.24×10^{-04}	7.24×10^{-04}
ALKENE KETONE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
ALPHA-PINENE	8.72×10^{-04}	1.07×10^{-04}	7.06×10^{-05}	1.48×10^{-03}	2.53×10^{-03}
ANILINE	1.97×10^{-03}	2.41×10^{-04}	1.59×10^{-04}	3.35×10^{-03}	5.72×10^{-03}
ANTHRACENE	4.75×10^{-04}	5.81×10^{-05}	3.85×10^{-05}	8.09×10^{-04}	1.38×10^{-03}
ANTHRAQUINONE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
BENZALDEHYDE	4.11×10^{-03}	5.03×10^{-04}	3.33×10^{-04}	7.00×10^{-03}	1.20×10^{-02}
BENZENE	1.09×10^{-01}	1.33×10^{-02}	8.83×10^{-03}	1.86×10^{-01}	3.17×10^{-01}
BENZO(A)ANTHRACENE	7.83×10^{-05}	9.57×10^{-06}	6.34×10^{-06}	1.33×10^{-04}	2.28×10^{-04}
BENZO(A)PYRENE	1.15×10^{-04}	1.40×10^{-05}	9.27×10^{-06}	1.95×10^{-04}	3.33×10^{-04}
BENZO(B)FLUORANTHENE	9.15×10^{-05}	1.12×10^{-05}	7.40×10^{-06}	1.56×10^{-04}	2.66×10^{-04}
BENZO(E)PYRENE	2.70×10^{-04}	3.30×10^{-05}	2.19×10^{-05}	4.60×10^{-04}	7.85×10^{-04}
BENZO(G,H,I,)PERYLENE	1.32×10^{-04}	1.61×10^{-05}	1.07×10^{-05}	2.25×10^{-04}	3.84×10^{-04}
BENZO(K)FLUORANTHENE	8.40×10^{-05}	1.03×10^{-05}	6.80×10^{-06}	1.43×10^{-04}	2.44×10^{-04}
BENZOIC ACID	9.97×10^{-05}	1.22×10^{-05}	8.07×10^{-06}	1.70×10^{-04}	2.90×10^{-04}
BENZYL CHLORIDE	1.05×10^{-03}	1.28×10^{-04}	8.47×10^{-05}	1.78×10^{-03}	3.04×10^{-03}
BETA-PINENE	5.73×10^{-04}	7.01×10^{-05}	4.64×10^{-05}	9.76×10^{-04}	1.67×10^{-03}
BIPHENYL	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
B-PHELLANDRENE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
BROMODINITROBENZENE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
BUTOXYBUTENE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
BUTOXYETHOXYETHANOL ACETATE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
BUTYL ACRYLATE	1.07×10^{-03}	1.31×10^{-04}	8.67×10^{-05}	1.82×10^{-03}	3.11×10^{-03}
BUTYL BENZOATE	5.23×10^{-04}	6.40×10^{-05}	4.24×10^{-05}	8.91×10^{-04}	1.52×10^{-03}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
BUTYL CARBITOL	9.72×10^{-04}	1.19×10^{-04}	7.87×10^{-05}	1.65×10^{-03}	2.82×10^{-03}
BUTYL CELLOSOLVE	1.10×10^{-03}	1.34×10^{-04}	8.88×10^{-05}	1.87×10^{-03}	3.19×10^{-03}
BUTYLCYCLOHEXANE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
BUTYLISOPROPYLPHTHALATE	1.25×10^{-04}	1.52×10^{-05}	1.01×10^{-05}	2.12×10^{-04}	3.62×10^{-04}
BUTYRALDEHYDE	1.10×10^{-03}	1.34×10^{-04}	8.88×10^{-05}	1.87×10^{-03}	3.19×10^{-03}
C10 AROMATIC	4.54×10^{-02}	5.55×10^{-03}	3.68×10^{-03}	7.73×10^{-02}	1.32×10^{-01}
C10 OLEFINS	7.48×10^{-05}	9.14×10^{-06}	6.05×10^{-06}	1.27×10^{-04}	2.17×10^{-04}
C10 PARAFFINS	3.26×10^{-03}	3.98×10^{-04}	2.64×10^{-04}	5.54×10^{-03}	9.46×10^{-03}
C2 ALKYL INDAN	9.97×10^{-05}	1.22×10^{-05}	8.07×10^{-06}	1.70×10^{-04}	2.90×10^{-04}
C2 CYCLOHEXANE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
C3 CYCLOHEXANE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
C3/C4/C5 ALKYLBENZENES	7.48×10^{-05}	9.14×10^{-06}	6.05×10^{-06}	1.27×10^{-04}	2.17×10^{-04}
C-3-HEXENE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
C4 SUBSTITUTED CYCLOHEXANE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
C4 SUBSTITUTED CYCLOHEXANONE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
C5 ESTER	4.99×10^{-05}	6.09×10^{-06}	4.03×10^{-06}	8.48×10^{-05}	1.45×10^{-04}
C5 OLEFIN	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
C5 PARAFFIN	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
C5 SUBSTITUTED CYCLOHEXANE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
C6 SUBSTITUTED CYCLOHEXANE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
C6H18O3SI3	2.24×10^{-04}	2.74×10^{-05}	1.82×10^{-05}	3.82×10^{-04}	6.52×10^{-04}
C-7 CYCLOPARAFFINS	1.77×10^{-03}	2.16×10^{-04}	1.43×10^{-04}	3.01×10^{-03}	5.14×10^{-03}
C7-C16 PARAFFINS	3.74×10^{-04}	4.57×10^{-05}	3.03×10^{-05}	6.36×10^{-04}	1.09×10^{-03}
C-8 CYCLOPARAFFINS	1.25×10^{-04}	1.52×10^{-05}	1.01×10^{-05}	2.12×10^{-04}	3.62×10^{-04}
C8 PARAFFIN	4.99×10^{-05}	6.09×10^{-06}	4.03×10^{-06}	8.48×10^{-05}	1.45×10^{-04}
C8H24O4SI4	7.48×10^{-05}	9.14×10^{-06}	6.05×10^{-06}	1.27×10^{-04}	2.17×10^{-04}
CAMPHENE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
CARBITOL	1.15×10^{-03}	1.40×10^{-04}	9.28×10^{-05}	1.95×10^{-03}	3.33×10^{-03}
CARBON MONOXIDE	$2.92 \times 10^{+01}$	3.56	2.36	$4.96 \times 10^{+01}$	$8.47 \times 10^{+01}$
CARBON SULFIDE	2.24×10^{-04}	2.74×10^{-05}	1.82×10^{-05}	3.82×10^{-04}	6.52×10^{-04}
CARBON TETRACHLORIDE	1.62×10^{-03}	1.98×10^{-04}	1.31×10^{-04}	2.76×10^{-03}	4.71×10^{-03}
CARBONYL SULFIDE	7.48×10^{-05}	9.14×10^{-06}	6.05×10^{-06}	1.27×10^{-04}	2.17×10^{-04}
CELLOSOLVE	8.97×10^{-04}	1.10×10^{-04}	7.26×10^{-05}	1.53×10^{-03}	2.61×10^{-03}
CELLOSOLVE ACETATE	8.97×10^{-04}	1.10×10^{-04}	7.26×10^{-05}	1.53×10^{-03}	2.61×10^{-03}
CHLOROBENZENE	1.77×10^{-03}	2.16×10^{-04}	1.43×10^{-04}	3.01×10^{-03}	5.14×10^{-03}
CHLORODIFLUOROMETHANE	3.99×10^{-04}	4.87×10^{-05}	3.23×10^{-05}	6.79×10^{-04}	1.16×10^{-03}
CHLOROFORM	1.27×10^{-03}	1.55×10^{-04}	1.03×10^{-04}	2.16×10^{-03}	3.69×10^{-03}
CHLOROPENTAFLUOROETHANE	4.99×10^{-05}	6.09×10^{-06}	4.03×10^{-06}	8.48×10^{-05}	1.45×10^{-04}
CHLOROPRENE	8.47×10^{-04}	1.04×10^{-04}	6.86×10^{-05}	1.44×10^{-03}	2.46×10^{-03}
CHLOROTRIFLUOROMETHANE	1.25×10^{-04}	1.52×10^{-05}	1.01×10^{-05}	2.12×10^{-04}	3.62×10^{-04}
CHROMIUM (III) COMPOUNDS	1.73×10^{-04}	2.12×10^{-05}	1.40×10^{-05}	2.95×10^{-04}	5.03×10^{-04}
CHROMIUM (VI) COMPOUNDS	7.21×10^{-05}	8.81×10^{-06}	5.83×10^{-06}	1.23×10^{-04}	2.09×10^{-04}
CHRYSENE	7.69×10^{-05}	9.40×10^{-06}	6.22×10^{-06}	1.31×10^{-04}	2.23×10^{-04}
CIS-2-BUTENE	7.88×10^{-03}	9.64×10^{-04}	6.38×10^{-04}	1.34×10^{-02}	2.29×10^{-02}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
CIS-2-PENTENE	3.43×10^{-03}	4.19×10^{-04}	2.77×10^{-04}	5.83×10^{-03}	9.96×10^{-03}
COBALT AND COMPOUNDS	2.45×10^{-04}	3.00×10^{-05}	1.98×10^{-05}	4.17×10^{-04}	7.12×10^{-04}
COPPER AND COMPOUNDS	2.45×10^{-04}	3.00×10^{-05}	1.98×10^{-05}	4.17×10^{-04}	7.12×10^{-04}
CORONENE	7.07×10^{-06}	8.64×10^{-07}	5.72×10^{-07}	1.20×10^{-05}	2.05×10^{-05}
CREOSOTE	9.22×10^{-04}	1.13×10^{-04}	7.46×10^{-05}	1.57×10^{-03}	2.68×10^{-03}
CRESOL	9.47×10^{-04}	1.16×10^{-04}	7.66×10^{-05}	1.61×10^{-03}	2.75×10^{-03}
CROTONALDEHYDE	1.20×10^{-03}	1.47×10^{-04}	9.71×10^{-05}	2.04×10^{-03}	3.49×10^{-03}
CYCLOHEXANE	2.78×10^{-02}	3.39×10^{-03}	2.25×10^{-03}	4.73×10^{-02}	8.07×10^{-02}
CYCLOHEXANOL	1.12×10^{-03}	1.37×10^{-04}	9.08×10^{-05}	1.91×10^{-03}	3.26×10^{-03}
CYCLOHEXANONE	1.32×10^{-03}	1.61×10^{-04}	1.07×10^{-04}	2.25×10^{-03}	3.84×10^{-03}
CYCLOHEXENE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
CYCLOPENTA(C,D)PYRENE	7.96×10^{-05}	9.73×10^{-06}	6.44×10^{-06}	1.36×10^{-04}	2.31×10^{-04}
CYCLOPENTANE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
CYCLOPENTENE	4.63×10^{-03}	5.66×10^{-04}	3.74×10^{-04}	7.88×10^{-03}	1.34×10^{-02}
DENATURANT	2.49×10^{-04}	3.05×10^{-05}	2.02×10^{-05}	4.24×10^{-04}	7.24×10^{-04}
DIBENZO(A,H)ANTHRACENE	3.89×10^{-05}	4.75×10^{-06}	3.15×10^{-06}	6.62×10^{-05}	1.13×10^{-04}
DIBUTYL PHTHALATE	9.97×10^{-05}	1.22×10^{-05}	8.07×10^{-06}	1.70×10^{-04}	2.90×10^{-04}
DICHLOROBENZENES	4.99×10^{-05}	6.09×10^{-06}	4.03×10^{-06}	8.48×10^{-05}	1.45×10^{-04}
DICHLORODIFLUOROMETHANE	8.72×10^{-04}	1.07×10^{-04}	7.06×10^{-05}	1.48×10^{-03}	2.53×10^{-03}
DICHLOROMETHANE	1.87×10^{-03}	2.28×10^{-04}	1.51×10^{-04}	3.18×10^{-03}	5.43×10^{-03}
DICHLOROTETRAFLUORETHANE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
DIETHYLCYCLOHEXANE	7.48×10^{-05}	9.14×10^{-06}	6.05×10^{-06}	1.27×10^{-04}	2.17×10^{-04}
DIETHYLENE GLYCOL	1.10×10^{-03}	1.34×10^{-04}	8.88×10^{-05}	1.87×10^{-03}	3.19×10^{-03}
DIISOPROPYL BENZENE	9.47×10^{-04}	1.16×10^{-04}	7.66×10^{-05}	1.61×10^{-03}	2.75×10^{-03}
DIMETHYL FORMAMIDE	8.97×10^{-04}	1.10×10^{-04}	7.26×10^{-05}	1.53×10^{-03}	2.61×10^{-03}
DIMETHYL PHTHALATE	1.50×10^{-04}	1.83×10^{-05}	1.21×10^{-05}	2.55×10^{-04}	4.34×10^{-04}
DIMETHYLCYCLOHEXANE	1.25×10^{-04}	1.52×10^{-05}	1.01×10^{-05}	2.12×10^{-04}	3.62×10^{-04}
DIMETHYLCYCLOPENTANE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
DIMETHYLETHER	2.79×10^{-03}	3.41×10^{-04}	2.26×10^{-04}	4.75×10^{-03}	8.11×10^{-03}
DIMETHYLHEXENE	2.23×10^{-03}	2.72×10^{-04}	1.80×10^{-04}	3.79×10^{-03}	6.47×10^{-03}
DIMETHYLOCTANES	7.48×10^{-05}	9.14×10^{-06}	6.05×10^{-06}	1.27×10^{-04}	2.17×10^{-04}
DIPROPYLENE GLYCOL	1.65×10^{-03}	2.01×10^{-04}	1.33×10^{-04}	2.80×10^{-03}	4.78×10^{-03}
D-LIMONENE	1.25×10^{-04}	1.52×10^{-05}	1.01×10^{-05}	2.12×10^{-04}	3.62×10^{-04}
DODECENE	1.25×10^{-03}	1.52×10^{-04}	1.01×10^{-04}	2.12×10^{-03}	3.62×10^{-03}
EPICHLOROHYDRIN	1.05×10^{-03}	1.28×10^{-04}	8.47×10^{-05}	1.78×10^{-03}	3.04×10^{-03}
ETHANE	3.07×10^{-02}	3.75×10^{-03}	2.48×10^{-03}	5.22×10^{-02}	8.91×10^{-02}
ETHANOLAMINE	1.10×10^{-03}	1.34×10^{-04}	8.88×10^{-05}	1.87×10^{-03}	3.19×10^{-03}
ETHYL ACETATE	1.10×10^{-03}	1.34×10^{-04}	8.88×10^{-05}	1.87×10^{-03}	3.19×10^{-03}
ETHYL ACRYLATE	1.25×10^{-03}	1.52×10^{-04}	1.01×10^{-04}	2.12×10^{-03}	3.62×10^{-03}
ETHYL ALCOHOL	3.39×10^{-03}	4.14×10^{-04}	2.74×10^{-04}	5.77×10^{-03}	9.85×10^{-03}
ETHYL CHLORIDE	7.23×10^{-04}	8.83×10^{-05}	5.85×10^{-05}	1.23×10^{-03}	2.10×10^{-03}
ETHYL ETHER	1.55×10^{-03}	1.89×10^{-04}	1.25×10^{-04}	2.63×10^{-03}	4.49×10^{-03}
ETHYL MERCAPTAN	8.23×10^{-04}	1.01×10^{-04}	6.66×10^{-05}	1.40×10^{-03}	2.39×10^{-03}
ETHYL STYRENE	7.48×10^{-05}	9.14×10^{-06}	6.05×10^{-06}	1.27×10^{-04}	2.17×10^{-04}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
ETHYLBENZENE	4.12×10^{-02}	5.04×10^{-03}	3.34×10^{-03}	7.02×10^{-02}	1.20×10^{-01}
ETHYLCYCLOHEXANE	4.99×10^{-05}	6.09×10^{-06}	4.03×10^{-06}	8.48×10^{-05}	1.45×10^{-04}
ETHYLCYCLOPENTANE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
ETHYLENE	1.44×10^{-01}	1.76×10^{-02}	1.17×10^{-02}	2.45×10^{-01}	4.19×10^{-01}
ETHYLENE DIBROMIDE	1.05×10^{-03}	1.28×10^{-04}	8.47×10^{-05}	1.78×10^{-03}	3.04×10^{-03}
ETHYLENE DICHLORIDE	1.45×10^{-03}	1.77×10^{-04}	1.17×10^{-04}	2.46×10^{-03}	4.20×10^{-03}
ETHYLENE GLYCOL	9.22×10^{-04}	1.13×10^{-04}	7.46×10^{-05}	1.57×10^{-03}	2.68×10^{-03}
ETHYLENE OXIDE	9.47×10^{-04}	1.16×10^{-04}	7.66×10^{-05}	1.61×10^{-03}	2.75×10^{-03}
ETHYLENEAMINES	1.10×10^{-03}	1.34×10^{-04}	8.88×10^{-05}	1.87×10^{-03}	3.19×10^{-03}
ETHYLHEPTENE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
ETHYLHEXANE	4.99×10^{-05}	6.09×10^{-06}	4.03×10^{-06}	8.48×10^{-05}	1.45×10^{-04}
ETHYLISOPROPYL ETHER	4.99×10^{-05}	6.09×10^{-06}	4.03×10^{-06}	8.48×10^{-05}	1.45×10^{-04}
ETHYLMETHYLCYCLOHEXANES	4.99×10^{-05}	6.09×10^{-06}	4.03×10^{-06}	8.48×10^{-05}	1.45×10^{-04}
ETHYL-PHENYL-PHENYL-ETHANE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
ETHYLTOLUENE	4.99×10^{-05}	6.09×10^{-06}	4.03×10^{-06}	8.48×10^{-05}	1.45×10^{-04}
FLUORANTHENE	5.52×10^{-04}	6.75×10^{-05}	4.47×10^{-05}	9.39×10^{-04}	1.60×10^{-03}
FLUORENE	9.29×10^{-04}	1.14×10^{-04}	7.52×10^{-05}	1.58×10^{-03}	2.70×10^{-03}
FORMALDEHYDE	3.57×10^{-02}	4.36×10^{-03}	2.89×10^{-03}	6.07×10^{-02}	1.04×10^{-01}
FORMIC ACID	1.05×10^{-03}	1.28×10^{-04}	8.47×10^{-05}	1.78×10^{-03}	3.04×10^{-03}
GLYOXAL	4.99×10^{-05}	6.09×10^{-06}	4.03×10^{-06}	8.48×10^{-05}	1.45×10^{-04}
HEPTENE	1.27×10^{-03}	1.55×10^{-04}	1.03×10^{-04}	2.16×10^{-03}	3.69×10^{-03}
HEXADECANE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
HEXAFLUOROETHANE	9.97×10^{-04}	1.22×10^{-04}	8.07×10^{-05}	1.70×10^{-03}	2.90×10^{-03}
HEXAMETHYLENEDIAMINE	1.67×10^{-03}	2.04×10^{-04}	1.35×10^{-04}	2.84×10^{-03}	4.85×10^{-03}
HEXYLENE GLYCOL	8.97×10^{-04}	1.10×10^{-04}	7.26×10^{-05}	1.53×10^{-03}	2.61×10^{-03}
INDANE	9.26×10^{-03}	1.13×10^{-03}	7.49×10^{-04}	1.58×10^{-02}	2.69×10^{-02}
INDENO(1,2,3-C,D)PYRENE	3.92×10^{-05}	4.79×10^{-06}	3.17×10^{-06}	6.68×10^{-05}	1.14×10^{-04}
ISOBUTANE	1.06×10^{-02}	1.30×10^{-03}	8.60×10^{-04}	1.81×10^{-02}	3.09×10^{-02}
ISOBUTYL ACRYLATE	9.47×10^{-04}	1.16×10^{-04}	7.66×10^{-05}	1.61×10^{-03}	2.75×10^{-03}
ISOBUTYL ALCOHOL	1.05×10^{-03}	1.28×10^{-04}	8.47×10^{-05}	1.78×10^{-03}	3.04×10^{-03}
ISOBUTYL ISOBUTYRATE	9.72×10^{-04}	1.19×10^{-04}	7.87×10^{-05}	1.65×10^{-03}	2.82×10^{-03}
ISOBUTYLBENZENE	8.40×10^{-03}	1.03×10^{-03}	6.80×10^{-04}	1.43×10^{-02}	2.44×10^{-02}
ISOBUTYLENE	2.42×10^{-02}	2.95×10^{-03}	1.96×10^{-03}	4.11×10^{-02}	7.02×10^{-02}
ISOBUTYRALDEHYDE	1.05×10^{-03}	1.28×10^{-04}	8.47×10^{-05}	1.78×10^{-03}	3.04×10^{-03}
ISOMERS OF BUTENE	1.25×10^{-04}	1.52×10^{-05}	1.01×10^{-05}	2.12×10^{-04}	3.62×10^{-04}
ISOMERS OF BUTYLBENZENE	1.50×10^{-04}	1.83×10^{-05}	1.21×10^{-05}	2.55×10^{-04}	4.34×10^{-04}
ISOMERS OF C10H18	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
ISOMERS OF DECANE	9.97×10^{-04}	1.22×10^{-04}	8.07×10^{-05}	1.70×10^{-03}	2.90×10^{-03}
ISOMERS OF DIETHYLBENZENE	7.48×10^{-05}	9.14×10^{-06}	6.05×10^{-06}	1.27×10^{-04}	2.17×10^{-04}
ISOMERS OF DODECANE	1.15×10^{-03}	1.40×10^{-04}	9.28×10^{-05}	1.95×10^{-03}	3.33×10^{-03}
ISOMERS OF ETHYLTOLUENE	9.97×10^{-05}	1.22×10^{-05}	8.07×10^{-06}	1.70×10^{-04}	2.90×10^{-04}
ISOMERS OF HEPTADECANE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
ISOMERS OF HEPTANE	6.23×10^{-04}	7.62×10^{-05}	5.04×10^{-05}	1.06×10^{-03}	1.81×10^{-03}
ISOMERS OF HEXANE	1.35×10^{-03}	1.65×10^{-04}	1.09×10^{-04}	2.29×10^{-03}	3.91×10^{-03}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
ISOMERS OF NONANE	4.74×10^{-04}	5.79×10^{-05}	3.83×10^{-05}	8.06×10^{-04}	1.38×10^{-03}
ISOMERS OF OCTADECANE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
ISOMERS OF OCTANE	3.74×10^{-04}	4.57×10^{-05}	3.03×10^{-05}	6.36×10^{-04}	1.09×10^{-03}
ISOMERS OF PENTADECANE	1.05×10^{-03}	1.28×10^{-04}	8.47×10^{-05}	1.78×10^{-03}	3.04×10^{-03}
ISOMERS OF PENTANE	2.77×10^{-03}	3.38×10^{-04}	2.24×10^{-04}	4.71×10^{-03}	8.04×10^{-03}
ISOMERS OF PENTENE	1.25×10^{-04}	1.52×10^{-05}	1.01×10^{-05}	2.12×10^{-04}	3.62×10^{-04}
ISOMERS OF PROPYLBENZENE	4.99×10^{-05}	6.09×10^{-06}	4.03×10^{-06}	8.48×10^{-05}	1.45×10^{-04}
ISOMERS OF TETRADECANE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
ISOMERS OF UNDECANE	1.25×10^{-04}	1.52×10^{-05}	1.01×10^{-05}	2.12×10^{-04}	3.62×10^{-04}
ISOMERS OF XYLENE	1.41×10^{-01}	1.72×10^{-02}	1.14×10^{-02}	2.40×10^{-01}	4.10×10^{-01}
ISOPENTANE	6.02×10^{-02}	7.35×10^{-03}	4.87×10^{-03}	1.02×10^{-01}	1.75×10^{-01}
ISOPRENE	2.91×10^{-03}	3.56×10^{-04}	2.36×10^{-04}	4.96×10^{-03}	8.46×10^{-03}
ISOPROPYL ACETATE	1.17×10^{-03}	1.43×10^{-04}	9.48×10^{-05}	1.99×10^{-03}	3.40×10^{-03}
ISOPROPYL ALCOHOL	1.82×10^{-03}	2.22×10^{-04}	1.47×10^{-04}	3.10×10^{-03}	5.29×10^{-03}
ISOPROPYLBENZENE	9.47×10^{-04}	1.16×10^{-04}	7.66×10^{-05}	1.61×10^{-03}	2.75×10^{-03}
LACTOL SPIRITS	8.97×10^{-04}	1.10×10^{-04}	7.26×10^{-05}	1.53×10^{-03}	2.61×10^{-03}
MALEIC ANHYDRIDE	1.74×10^{-04}	2.13×10^{-05}	1.41×10^{-05}	2.97×10^{-04}	5.07×10^{-04}
MANGANESE AND COMPOUNDS	2.45×10^{-04}	3.00×10^{-05}	1.98×10^{-05}	4.17×10^{-04}	7.12×10^{-04}
M-DIETHYLBENZENE	9.77×10^{-03}	1.19×10^{-03}	7.91×10^{-04}	1.66×10^{-02}	2.84×10^{-02}
METHANE	1.88×10^{-01}	2.30×10^{-02}	1.52×10^{-02}	3.20×10^{-01}	5.46×10^{-01}
METHYL ACETATE	1.77×10^{-03}	2.16×10^{-04}	1.43×10^{-04}	3.01×10^{-03}	5.14×10^{-03}
METHYL ACRYLATE	9.47×10^{-04}	1.16×10^{-04}	7.66×10^{-05}	1.61×10^{-03}	2.75×10^{-03}
METHYL ALCOHOL	3.49×10^{-03}	4.26×10^{-04}	2.82×10^{-04}	5.94×10^{-03}	1.01×10^{-02}
METHYL AMYL KETONE	1.27×10^{-03}	1.55×10^{-04}	1.03×10^{-04}	2.16×10^{-03}	3.69×10^{-03}
METHYL CARBITOL	9.72×10^{-04}	1.19×10^{-04}	7.87×10^{-05}	1.65×10^{-03}	2.82×10^{-03}
METHYL CELLOSOLVE	9.72×10^{-04}	1.19×10^{-04}	7.87×10^{-05}	1.65×10^{-03}	2.82×10^{-03}
METHYL ETHYL KETONE	3.04×10^{-03}	3.72×10^{-04}	2.46×10^{-04}	5.18×10^{-03}	8.83×10^{-03}
METHYL FORMATE	5.23×10^{-04}	6.40×10^{-05}	4.24×10^{-05}	8.91×10^{-04}	1.52×10^{-03}
METHYL GLYOXAL	4.99×10^{-05}	6.09×10^{-06}	4.03×10^{-06}	8.48×10^{-05}	1.45×10^{-04}
METHYL ISOBUTYL KETONE	1.40×10^{-03}	1.71×10^{-04}	1.13×10^{-04}	2.38×10^{-03}	4.06×10^{-03}
METHYL METHACRYLATE	1.15×10^{-03}	1.40×10^{-04}	9.28×10^{-05}	1.95×10^{-03}	3.33×10^{-03}
METHYL MYRISTATE	7.48×10^{-05}	9.14×10^{-06}	6.05×10^{-06}	1.27×10^{-04}	2.17×10^{-04}
METHYL NAPHTHALENES	9.97×10^{-05}	1.22×10^{-05}	8.07×10^{-06}	1.70×10^{-04}	2.90×10^{-04}
METHYL PALMITATE	1.99×10^{-04}	2.44×10^{-05}	1.61×10^{-05}	3.39×10^{-04}	5.79×10^{-04}
METHYL STEARATE	2.74×10^{-04}	3.35×10^{-05}	2.22×10^{-05}	4.67×10^{-04}	7.97×10^{-04}
METHYL STYRENE	1.02×10^{-03}	1.25×10^{-04}	8.27×10^{-05}	1.74×10^{-03}	2.97×10^{-03}
METHYL TERT-BUTYL ETHER	2.82×10^{-01}	3.44×10^{-02}	2.28×10^{-02}	4.79×10^{-01}	8.18×10^{-01}
METHYLACETYLENE	2.91×10^{-03}	3.56×10^{-04}	2.36×10^{-04}	4.96×10^{-03}	8.46×10^{-03}
METHYLAL	4.24×10^{-04}	5.18×10^{-05}	3.43×10^{-05}	7.21×10^{-04}	1.23×10^{-03}
METHYLALLENE	9.97×10^{-04}	1.22×10^{-04}	8.07×10^{-05}	1.70×10^{-03}	2.90×10^{-03}
METHYLCYCLOHEXANE	8.06×10^{-03}	9.84×10^{-04}	6.52×10^{-04}	1.37×10^{-02}	2.34×10^{-02}
METHYLCYCLOPENTANE	1.05×10^{-02}	1.28×10^{-03}	8.46×10^{-04}	1.78×10^{-02}	3.04×10^{-02}
METHYLCYCLOPENTENE	3.43×10^{-04}	4.19×10^{-05}	2.77×10^{-05}	5.83×10^{-04}	9.96×10^{-04}
METHYLDECANES	4.99×10^{-05}	6.09×10^{-06}	4.03×10^{-06}	8.48×10^{-05}	1.45×10^{-04}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
METHYLENE BROMIDE	7.48×10^{-05}	9.14×10^{-06}	6.05×10^{-06}	1.27×10^{-04}	2.17×10^{-04}
METHYLHEXANE	7.48×10^{-05}	9.14×10^{-06}	6.05×10^{-06}	1.27×10^{-04}	2.17×10^{-04}
METHYLNONANE	4.99×10^{-05}	6.09×10^{-06}	4.03×10^{-06}	8.48×10^{-05}	1.45×10^{-04}
METHYLOCTANES	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
METHYLPENTANE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
METHYLPROPYLCYCLOHEXANES	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
M-ETHYLTOLUENE	2.14×10^{-02}	2.62×10^{-03}	1.73×10^{-03}	3.65×10^{-02}	6.22×10^{-02}
METHYLUNDECANE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
MINERAL SPIRITS	1.60×10^{-03}	1.95×10^{-04}	1.29×10^{-04}	2.72×10^{-03}	4.63×10^{-03}
MYRCENE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
NAPHTHA	1.17×10^{-03}	1.43×10^{-04}	9.48×10^{-05}	1.99×10^{-03}	3.40×10^{-03}
NAPHTHALENE	4.74×10^{-02}	5.79×10^{-03}	3.83×10^{-03}	8.06×10^{-02}	1.38×10^{-01}
N-BUTANE	6.53×10^{-02}	7.98×10^{-03}	5.28×10^{-03}	1.11×10^{-01}	1.90×10^{-01}
N-BUTYL ACETATE	1.45×10^{-03}	1.77×10^{-04}	1.17×10^{-04}	2.46×10^{-03}	4.20×10^{-03}
N-BUTYL ALCOHOL	1.72×10^{-03}	2.10×10^{-04}	1.39×10^{-04}	2.93×10^{-03}	5.00×10^{-03}
N-DECANE	3.43×10^{-03}	4.19×10^{-04}	2.77×10^{-04}	5.83×10^{-03}	9.96×10^{-03}
N-DODECANE	4.74×10^{-04}	5.79×10^{-05}	3.83×10^{-05}	8.06×10^{-04}	1.38×10^{-03}
N-HEPTANE	9.08×10^{-03}	1.11×10^{-03}	7.35×10^{-04}	1.55×10^{-02}	2.64×10^{-02}
N-HEXANE	3.21×10^{-02}	3.92×10^{-03}	2.60×10^{-03}	5.47×10^{-02}	9.33×10^{-02}
NICKEL AND COMPOUNDS	2.45×10^{-04}	3.00×10^{-05}	1.98×10^{-05}	4.17×10^{-04}	7.12×10^{-04}
NITRIC OXIDE	$2.09 \times 10^{+01}$	2.55	1.69	$3.55 \times 10^{+01}$	$6.06 \times 10^{+01}$
NITROBENZENE	8.23×10^{-04}	1.01×10^{-04}	6.66×10^{-05}	1.40×10^{-03}	2.39×10^{-03}
NITROGEN DIOXIDE	1.68	2.06×10^{-01}	1.36×10^{-01}	2.86	4.89
N-NONANE	4.28×10^{-03}	5.24×10^{-04}	3.47×10^{-04}	7.29×10^{-03}	1.24×10^{-02}
N-OCTANE	5.14×10^{-03}	6.28×10^{-04}	4.16×10^{-04}	8.75×10^{-03}	1.49×10^{-02}
NONENONE	4.99×10^{-05}	6.09×10^{-06}	4.03×10^{-06}	8.48×10^{-05}	1.45×10^{-04}
N-PENTADECANE	4.24×10^{-04}	5.18×10^{-05}	3.43×10^{-05}	7.21×10^{-04}	1.23×10^{-03}
N-PENTANE	2.74×10^{-02}	3.35×10^{-03}	2.22×10^{-03}	4.67×10^{-02}	7.97×10^{-02}
N-PENTYLCYCLOHEXANE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
N-PROPYL ACETATE	1.22×10^{-03}	1.49×10^{-04}	9.88×10^{-05}	2.08×10^{-03}	3.55×10^{-03}
N-PROPYL ALCOHOL	1.05×10^{-03}	1.28×10^{-04}	8.47×10^{-05}	1.78×10^{-03}	3.04×10^{-03}
N-PROPYLBENZENE	9.60×10^{-03}	1.17×10^{-03}	7.77×10^{-04}	1.63×10^{-02}	2.79×10^{-02}
N-TETRADECANE	1.74×10^{-04}	2.13×10^{-05}	1.41×10^{-05}	2.97×10^{-04}	5.07×10^{-04}
N-TRIDECANE	2.49×10^{-04}	3.05×10^{-05}	2.02×10^{-05}	4.24×10^{-04}	7.24×10^{-04}
N-UNDECANE	1.03×10^{-02}	1.26×10^{-03}	8.32×10^{-04}	1.75×10^{-02}	2.99×10^{-02}
OCTAMETHYLCYCLOTETRASILOXANE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
O-DICHLOROBENZENE	9.97×10^{-04}	1.22×10^{-04}	8.07×10^{-05}	1.70×10^{-03}	2.90×10^{-03}
O-ETHYLTOLUENE	4.46×10^{-03}	5.45×10^{-04}	3.61×10^{-04}	7.58×10^{-03}	1.29×10^{-02}
OXIDES OF NITROGEN	$3.37 \times 10^{+01}$	4.11	2.72	$5.73 \times 10^{+01}$	$9.78 \times 10^{+01}$
PALMITIC ACID	4.99×10^{-04}	6.09×10^{-05}	4.03×10^{-05}	8.48×10^{-04}	1.45×10^{-03}
PARAFFINS (C16-C34)	4.99×10^{-05}	6.09×10^{-06}	4.03×10^{-06}	8.48×10^{-05}	1.45×10^{-04}
PARTICULATE MATTER < 10 µm	4.90×10^{-01}	5.99×10^{-02}	3.97×10^{-02}	8.34×10^{-01}	1.42
PARTICULATE MATTER < 2.5 µm	4.51×10^{-01}	5.51×10^{-02}	3.65×10^{-02}	7.68×10^{-01}	1.31
P-DICHLOROBENZENE	1.79×10^{-03}	2.19×10^{-04}	1.45×10^{-04}	3.05×10^{-03}	5.21×10^{-03}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
PHENANTHRENE	1.42×10^{-03}	1.74×10^{-04}	1.15×10^{-04}	2.42×10^{-03}	4.13×10^{-03}
PHENOL	1.10×10^{-03}	1.34×10^{-04}	8.88×10^{-05}	1.87×10^{-03}	3.19×10^{-03}
PHENYL ISOCYANATE	2.99×10^{-04}	3.66×10^{-05}	2.42×10^{-05}	5.09×10^{-04}	8.69×10^{-04}
PHTHALIC ANHYDRIDE	4.99×10^{-04}	6.09×10^{-05}	4.03×10^{-05}	8.48×10^{-04}	1.45×10^{-03}
PIPERYLENE	9.97×10^{-04}	1.22×10^{-04}	8.07×10^{-05}	1.70×10^{-03}	2.90×10^{-03}
POLYCHLORINATED DIOXINS AND FURANS	2.02×10^{-12}	2.47×10^{-13}	1.64×10^{-13}	3.44×10^{-12}	5.88×10^{-12}
POLYCYCLIC AROMATIC HYDROCARBONS	5.53×10^{-02}	6.75×10^{-03}	4.47×10^{-03}	9.41×10^{-02}	1.61×10^{-01}
PROPADIENE	2.23×10^{-03}	2.72×10^{-04}	1.80×10^{-04}	3.79×10^{-03}	6.47×10^{-03}
PROPANE	5.98×10^{-03}	7.31×10^{-04}	4.84×10^{-04}	1.02×10^{-02}	1.74×10^{-02}
PROPIONALDEHYDE	4.77×10^{-03}	5.83×10^{-04}	3.86×10^{-04}	8.11×10^{-03}	1.39×10^{-02}
PROPIONIC ACID	9.97×10^{-04}	1.22×10^{-04}	8.07×10^{-05}	1.70×10^{-03}	2.90×10^{-03}
PROPYLCYCLOHEXANE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
PROPYLENE	4.94×10^{-02}	6.03×10^{-03}	3.99×10^{-03}	8.40×10^{-02}	1.43×10^{-01}
PROPYLENE DICHLORIDE	4.99×10^{-05}	6.09×10^{-06}	4.03×10^{-06}	8.48×10^{-05}	1.45×10^{-04}
PROPYLENE GLYCOL	9.47×10^{-04}	1.16×10^{-04}	7.66×10^{-05}	1.61×10^{-03}	2.75×10^{-03}
PROPYLENE OXIDE	1.25×10^{-03}	1.52×10^{-04}	1.01×10^{-04}	2.12×10^{-03}	3.62×10^{-03}
PYRENE	8.66×10^{-04}	1.06×10^{-04}	7.01×10^{-05}	1.47×10^{-03}	2.52×10^{-03}
RETENE	9.67×10^{-05}	1.18×10^{-05}	7.82×10^{-06}	1.65×10^{-04}	2.81×10^{-04}
S-BUTYL ALCOHOL	8.47×10^{-04}	1.04×10^{-04}	6.86×10^{-05}	1.44×10^{-03}	2.46×10^{-03}
S-BUTYLBENZENE	2.91×10^{-03}	3.56×10^{-04}	2.36×10^{-04}	4.96×10^{-03}	8.46×10^{-03}
STYRENE	1.58×10^{-03}	1.93×10^{-04}	1.28×10^{-04}	2.68×10^{-03}	4.58×10^{-03}
SUBSTITUTED C9 ESTER (C12)	2.24×10^{-04}	2.74×10^{-05}	1.82×10^{-05}	3.82×10^{-04}	6.52×10^{-04}
SULFUR DIOXIDE	7.96×10^{-01}	9.72×10^{-02}	6.44×10^{-02}	1.35	2.31
T-3-HEXENE	3.43×10^{-03}	4.19×10^{-04}	2.77×10^{-04}	5.83×10^{-03}	9.96×10^{-03}
TERT-BUTYL ALCOHOL	1.05×10^{-03}	1.28×10^{-04}	8.47×10^{-05}	1.78×10^{-03}	3.04×10^{-03}
TETRACHLOROETHYLENE	1.74×10^{-03}	2.13×10^{-04}	1.41×10^{-04}	2.97×10^{-03}	5.07×10^{-03}
TETRAFLUOROMETHANE	7.48×10^{-05}	9.14×10^{-06}	6.05×10^{-06}	1.27×10^{-04}	2.17×10^{-04}
TOLUENE	1.49×10^{-01}	1.83×10^{-02}	1.21×10^{-02}	2.54×10^{-01}	4.34×10^{-01}
TOLUENE DIISOCYANATE	1.65×10^{-03}	2.01×10^{-04}	1.33×10^{-04}	2.80×10^{-03}	4.78×10^{-03}
TOTAL AROMATIC AMINES	9.97×10^{-05}	1.22×10^{-05}	8.07×10^{-06}	1.70×10^{-04}	2.90×10^{-04}
TOTAL C2-C5 ALDEHYDES	2.99×10^{-04}	3.66×10^{-05}	2.42×10^{-05}	5.09×10^{-04}	8.69×10^{-04}
TOTAL SUSPENDED PARTICULATES	5.16×10^{-01}	6.31×10^{-02}	4.18×10^{-02}	8.78×10^{-01}	1.50
TOTAL VOCS	2.08	2.54×10^{-01}	1.68×10^{-01}	3.54	6.04
TRANS-2-BUTENE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
TRANS-2-PENTENE	5.83×10^{-03}	7.12×10^{-04}	4.72×10^{-04}	9.92×10^{-03}	1.69×10^{-02}
TRICHLOROBENZENES	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
TRICHLOROETHYLENE	1.07×10^{-03}	1.31×10^{-04}	8.67×10^{-05}	1.82×10^{-03}	3.11×10^{-03}
TRICHLOROFLUOROMETHANE	1.52×10^{-03}	1.86×10^{-04}	1.23×10^{-04}	2.59×10^{-03}	4.42×10^{-03}
TRICHLOROTRIFLUOROETHANE	9.97×10^{-04}	1.22×10^{-04}	8.07×10^{-05}	1.70×10^{-03}	2.90×10^{-03}
TRIFLUOROMETHANE	7.48×10^{-04}	9.14×10^{-05}	6.05×10^{-05}	1.27×10^{-03}	2.17×10^{-03}
TRIMETHYLBENZENE	2.74×10^{-04}	3.35×10^{-05}	2.22×10^{-05}	4.67×10^{-04}	7.97×10^{-04}
TRIMETHYLCYCLOHEXANES	4.99×10^{-05}	6.09×10^{-06}	4.03×10^{-06}	8.48×10^{-05}	1.45×10^{-04}
TRIMETHYLCYCLOPENTANE	2.49×10^{-05}	3.05×10^{-06}	2.02×10^{-06}	4.24×10^{-05}	7.24×10^{-05}
TRIMETHYLDECENE	4.99×10^{-05}	6.09×10^{-06}	4.03×10^{-06}	8.48×10^{-05}	1.45×10^{-04}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
TRIMETHYLFLUOROSILANE	1.72×10^{-03}	2.10×10^{-04}	1.39×10^{-04}	2.93×10^{-03}	5.00×10^{-03}
TRIMETHYLHEPTANES	4.99×10^{-05}	6.09×10^{-06}	4.03×10^{-06}	8.48×10^{-05}	1.45×10^{-04}
VINYL ACETATE	1.37×10^{-03}	1.68×10^{-04}	1.11×10^{-04}	2.33×10^{-03}	3.98×10^{-03}
VINYL CHLORIDE	1.05×10^{-03}	1.28×10^{-04}	8.47×10^{-05}	1.78×10^{-03}	3.04×10^{-03}
ZINC AND COMPOUNDS	2.45×10^{-04}	3.00×10^{-05}	1.98×10^{-05}	4.17×10^{-04}	7.12×10^{-04}

Table C1.7: Annual Emissions from Commercial Boats – Diesel

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
1,2,4-TRIMETHYLBENZENE	2.01×10^{-01}	2.45×10^{-02}	1.62×10^{-02}	3.41×10^{-01}	5.83×10^{-01}
1,3,5-TRIMETHYLBENZENE	5.93×10^{-02}	7.25×10^{-03}	4.80×10^{-03}	1.01×10^{-01}	1.72×10^{-01}
1,3-BUTADIENE	7.07×10^{-02}	8.64×10^{-03}	5.72×10^{-03}	1.20×10^{-01}	2.05×10^{-01}
1-METHYL-3-ETHYLBENZENE	4.79×10^{-02}	5.85×10^{-03}	3.87×10^{-03}	8.15×10^{-02}	1.39×10^{-01}
1-METHYL-4-ETHYLBENZENE	1.19×10^{-01}	1.45×10^{-02}	9.59×10^{-03}	2.02×10^{-01}	3.44×10^{-01}
1-METHYLNAPHTHALENE	8.62×10^{-02}	1.05×10^{-02}	6.97×10^{-03}	1.47×10^{-01}	2.50×10^{-01}
1-METHYLPHENANTHRENE	3.88×10^{-03}	4.74×10^{-04}	3.14×10^{-04}	6.60×10^{-03}	1.13×10^{-02}
2,2,4-TRIMETHYLPENTANE	2.83×10^{-01}	3.46×10^{-02}	2.29×10^{-02}	4.81×10^{-01}	8.21×10^{-01}
2,2-DIMETHYLBUTANE	7.07×10^{-02}	8.64×10^{-03}	5.72×10^{-03}	1.20×10^{-01}	2.05×10^{-01}
2,3,4-TRIMETHYLPENTANE	7.07×10^{-02}	8.64×10^{-03}	5.72×10^{-03}	1.20×10^{-01}	2.05×10^{-01}
2,3-DIMETHYLBUTANE	1.30×10^{-01}	1.59×10^{-02}	1.05×10^{-02}	2.21×10^{-01}	3.78×10^{-01}
2,3-DIMETHYLHEXANE	3.65×10^{-02}	4.46×10^{-03}	2.95×10^{-03}	6.21×10^{-02}	1.06×10^{-01}
2,3-DIMETHYLPENTANE	1.64×10^{-01}	2.01×10^{-02}	1.33×10^{-02}	2.79×10^{-01}	4.77×10^{-01}
2,4-DIMETHYLHEXANE	1.14×10^{-02}	1.40×10^{-03}	9.24×10^{-04}	1.94×10^{-02}	3.32×10^{-02}
2,4-DIMETHYLPENTANE	9.35×10^{-02}	1.14×10^{-02}	7.56×10^{-03}	1.59×10^{-01}	2.72×10^{-01}
2,5-DIMETHYLHEXANE	1.14×10^{-02}	1.40×10^{-03}	9.24×10^{-04}	1.94×10^{-02}	3.32×10^{-02}
2-METHYL-1-BUTENE	5.93×10^{-02}	7.25×10^{-03}	4.80×10^{-03}	1.01×10^{-01}	1.72×10^{-01}
2-METHYL-2-PENTENE	4.79×10^{-02}	5.85×10^{-03}	3.87×10^{-03}	8.15×10^{-02}	1.39×10^{-01}
2-METHYL-2-PROPENAL	9.12×10^{-01}	1.11×10^{-01}	7.38×10^{-02}	1.55	2.65
2-METHYLANTHRACENE	2.36×10^{-03}	2.88×10^{-04}	1.91×10^{-04}	4.02×10^{-03}	6.86×10^{-03}
2-METHYLCHOLANTHRENE	1.64×10^{-02}	2.00×10^{-03}	1.33×10^{-03}	2.79×10^{-02}	4.76×10^{-02}
2-METHYLHEPTANE	2.28×10^{-02}	2.79×10^{-03}	1.84×10^{-03}	3.88×10^{-02}	6.62×10^{-02}
2-METHYLHEXANE	1.30×10^{-01}	1.59×10^{-02}	1.05×10^{-02}	2.21×10^{-01}	3.78×10^{-01}
2-METHYLNAPHTHALENE	1.39×10^{-01}	1.70×10^{-02}	1.13×10^{-02}	2.37×10^{-01}	4.05×10^{-01}
2-METHYLPENTANE	2.12×10^{-01}	2.59×10^{-02}	1.72×10^{-02}	3.61×10^{-01}	6.16×10^{-01}
3-ETHYLHEXANE	4.79×10^{-02}	5.85×10^{-03}	3.87×10^{-03}	8.15×10^{-02}	1.39×10^{-01}
3-METHYL-1-BUTENE	3.65×10^{-02}	4.46×10^{-03}	2.95×10^{-03}	6.21×10^{-02}	1.06×10^{-01}
3-METHYLHEXANE	7.07×10^{-02}	8.64×10^{-03}	5.72×10^{-03}	1.20×10^{-01}	2.05×10^{-01}
3-METHYLPENTANE	1.53×10^{-01}	1.87×10^{-02}	1.24×10^{-02}	2.60×10^{-01}	4.44×10^{-01}
3-METHYLPHENANTHRENE	6.91×10^{-03}	8.45×10^{-04}	5.59×10^{-04}	1.18×10^{-02}	2.01×10^{-02}
9-METHYLPHENANTHRENE	5.23×10^{-03}	6.39×10^{-04}	4.23×10^{-04}	8.89×10^{-03}	1.52×10^{-02}
ACENAPHTHENE	3.63×10^{-02}	4.44×10^{-03}	2.94×10^{-03}	6.18×10^{-02}	1.06×10^{-01}
ACENAPHTHYLENE	3.05×10^{-02}	3.72×10^{-03}	2.47×10^{-03}	5.19×10^{-02}	8.85×10^{-02}
ACETALDEHYDE	9.53	1.16	7.71×10^{-01}	$1.62 \times 10^{+01}$	$2.77 \times 10^{+01}$
ACETOPHENONE	1.16	1.42×10^{-01}	9.41×10^{-02}	1.98	3.38
ACETYLENE	1.05	1.28×10^{-01}	8.49×10^{-02}	1.79	3.05
ACROLEIN	7.75×10^{-01}	9.47×10^{-02}	6.27×10^{-02}	1.32	2.25
ANTHRACENE	6.04×10^{-03}	7.38×10^{-04}	4.89×10^{-04}	1.03×10^{-02}	1.76×10^{-02}
ANTIMONY AND COMPOUNDS	1.10×10^{-03}	1.34×10^{-04}	8.88×10^{-05}	1.87×10^{-03}	3.19×10^{-03}
ARSENIC AND COMPOUNDS	1.15×10^{-03}	1.40×10^{-04}	9.27×10^{-05}	1.95×10^{-03}	3.33×10^{-03}
BENZALDEHYDE	8.66×10^{-01}	1.06×10^{-01}	7.01×10^{-02}	1.47	2.52
BENZENE	6.25×10^{-01}	7.64×10^{-02}	5.06×10^{-02}	1.06	1.81
BENZO(A)ANTHRACENE	7.34×10^{-03}	8.97×10^{-04}	5.94×10^{-04}	1.25×10^{-02}	2.13×10^{-02}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
BENZO(A)PYRENE	6.08×10^{-03}	7.43×10^{-04}	4.92×10^{-04}	1.04×10^{-02}	1.77×10^{-02}
BENZO(B)FLUORANTHENE	3.37×10^{-03}	4.12×10^{-04}	2.73×10^{-04}	5.74×10^{-03}	9.80×10^{-03}
BENZO(E)PYRENE	3.60×10^{-03}	4.39×10^{-04}	2.91×10^{-04}	6.12×10^{-03}	1.04×10^{-02}
BENZO(G,H,I)FLUORANTHENE	1.31×10^{-03}	1.60×10^{-04}	1.06×10^{-04}	2.22×10^{-03}	3.80×10^{-03}
BENZO(G,H,I,)PERYLENE	2.53×10^{-03}	3.09×10^{-04}	2.04×10^{-04}	4.30×10^{-03}	7.34×10^{-03}
BENZO(K)FLUORANTHENE	3.25×10^{-03}	3.97×10^{-04}	2.63×10^{-04}	5.53×10^{-03}	9.45×10^{-03}
BERYLLIUM AND COMPOUNDS	4.19×10^{-03}	5.12×10^{-04}	3.39×10^{-04}	7.13×10^{-03}	1.22×10^{-02}
BUTYRALDEHYDE	2.96×10^{-01}	3.62×10^{-02}	2.40×10^{-02}	5.05×10^{-01}	8.61×10^{-01}
CADMIUM AND COMPOUNDS	1.19×10^{-04}	1.46×10^{-05}	9.64×10^{-06}	2.03×10^{-04}	3.46×10^{-04}
CARBON MONOXIDE	$5.12 \times 10^{+02}$	$6.26 \times 10^{+01}$	$4.15 \times 10^{+01}$	$8.72 \times 10^{+02}$	$1.49 \times 10^{+03}$
CHROMIUM (III) COMPOUNDS	3.19×10^{-04}	3.90×10^{-05}	2.58×10^{-05}	5.43×10^{-04}	9.28×10^{-04}
CHROMIUM (VI) COMPOUNDS	1.33×10^{-04}	1.62×10^{-05}	1.08×10^{-05}	2.26×10^{-04}	3.86×10^{-04}
CHRYSENE	4.03×10^{-03}	4.93×10^{-04}	3.26×10^{-04}	6.86×10^{-03}	1.17×10^{-02}
CIS-2-BUTENE	5.93×10^{-02}	7.25×10^{-03}	4.80×10^{-03}	1.01×10^{-01}	1.72×10^{-01}
CIS-2-HEXENE	2.28×10^{-02}	2.79×10^{-03}	1.84×10^{-03}	3.88×10^{-02}	6.62×10^{-02}
COBALT AND COMPOUNDS	8.10×10^{-04}	9.90×10^{-05}	6.56×10^{-05}	1.38×10^{-03}	2.35×10^{-03}
COPPER AND COMPOUNDS	1.19×10^{-02}	1.45×10^{-03}	9.61×10^{-04}	2.02×10^{-02}	3.45×10^{-02}
CORONENE	1.69×10^{-04}	2.06×10^{-05}	1.37×10^{-05}	2.87×10^{-04}	4.90×10^{-04}
CROTONALDEHYDE	3.06	3.73×10^{-01}	2.47×10^{-01}	5.20	8.88
CYCLOHEXANE	4.79×10^{-02}	5.85×10^{-03}	3.87×10^{-03}	8.15×10^{-02}	1.39×10^{-01}
CYCLOPENTA(C,D)PYRENE	5.57×10^{-03}	6.81×10^{-04}	4.51×10^{-04}	9.48×10^{-03}	1.62×10^{-02}
CYCLOPENTANE	9.35×10^{-02}	1.14×10^{-02}	7.56×10^{-03}	1.59×10^{-01}	2.72×10^{-01}
CYCLOPENTENE	4.79×10^{-02}	5.85×10^{-03}	3.87×10^{-03}	8.15×10^{-02}	1.39×10^{-01}
DECANOIC ACID	1.66×10^{-02}	2.03×10^{-03}	1.34×10^{-03}	2.83×10^{-02}	4.82×10^{-02}
DECYLCYCLOHEXANE	8.72×10^{-03}	1.07×10^{-03}	7.06×10^{-04}	1.48×10^{-02}	2.53×10^{-02}
DIACETYL	2.05×10^{-01}	2.51×10^{-02}	1.66×10^{-02}	3.49×10^{-01}	5.96×10^{-01}
DIBENZO(A,H)ANTHRACENE	3.28×10^{-03}	4.01×10^{-04}	2.65×10^{-04}	5.58×10^{-03}	9.53×10^{-03}
DIBENZOFURAN	6.53×10^{-03}	7.98×10^{-04}	5.29×10^{-04}	1.11×10^{-02}	1.90×10^{-02}
EICOSANE	4.70×10^{-02}	5.74×10^{-03}	3.80×10^{-03}	8.00×10^{-02}	1.37×10^{-01}
ETHYLBENZENE	1.07×10^{-01}	1.31×10^{-02}	8.67×10^{-03}	1.82×10^{-01}	3.11×10^{-01}
ETHYLENE	1.95	2.39×10^{-01}	1.58×10^{-01}	3.32	5.67
FLUORANTHENE	2.54×10^{-03}	3.11×10^{-04}	2.06×10^{-04}	4.33×10^{-03}	7.38×10^{-03}
FLUORENE	2.21×10^{-02}	2.71×10^{-03}	1.79×10^{-03}	3.77×10^{-02}	6.43×10^{-02}
FORMALDEHYDE	5.08	6.21×10^{-01}	4.11×10^{-01}	8.65	$1.48 \times 10^{+01}$
GLYOXAL	4.79×10^{-01}	5.85×10^{-02}	3.87×10^{-02}	8.15×10^{-01}	1.39
HEPTADECANE	1.40×10^{-01}	1.71×10^{-02}	1.13×10^{-02}	2.38×10^{-01}	4.07×10^{-01}
HEPTANAL	7.30×10^{-01}	8.92×10^{-02}	5.90×10^{-02}	1.24	2.12
HEPTYLCYCLOHEXANE	4.55×10^{-03}	5.56×10^{-04}	3.68×10^{-04}	7.75×10^{-03}	1.32×10^{-02}
HEXADECANE	1.62×10^{-01}	1.98×10^{-02}	1.31×10^{-02}	2.76×10^{-01}	4.71×10^{-01}
HEXALDEHYDE	5.02×10^{-01}	6.13×10^{-02}	4.06×10^{-02}	8.54×10^{-01}	1.46
HEXYLCYCLOHEXANE	3.41×10^{-03}	4.17×10^{-04}	2.76×10^{-04}	5.81×10^{-03}	9.92×10^{-03}
INDENO(1,2,3-C,D)PYRENE	4.73×10^{-03}	5.78×10^{-04}	3.83×10^{-04}	8.05×10^{-03}	1.37×10^{-02}
ISOBUTYLENE	2.60×10^{-01}	3.18×10^{-02}	2.10×10^{-02}	4.42×10^{-01}	7.55×10^{-01}
ISOMERS OF XYLENE	7.21×10^{-01}	8.81×10^{-02}	5.83×10^{-02}	1.23	2.09

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
ISOPENTANE	6.25×10^{-01}	7.64×10^{-02}	5.06×10^{-02}	1.06	1.81
LAURIC ACID	1.34×10^{-02}	1.63×10^{-03}	1.08×10^{-03}	2.27×10^{-02}	3.88×10^{-02}
LEAD AND COMPOUNDS	1.12×10^{-03}	1.37×10^{-04}	9.07×10^{-05}	1.91×10^{-03}	3.26×10^{-03}
MERCURY AND COMPOUNDS	2.87×10^{-04}	3.50×10^{-05}	2.32×10^{-05}	4.88×10^{-04}	8.33×10^{-04}
METHYL ETHYL KETONE	1.71	2.09×10^{-01}	1.38×10^{-01}	2.91	4.97
METHYLCYCLOHEXANE	1.19×10^{-01}	1.45×10^{-02}	9.59×10^{-03}	2.02×10^{-01}	3.44×10^{-01}
METHYLCYCLOPENTANE	1.41×10^{-01}	1.73×10^{-02}	1.14×10^{-02}	2.41×10^{-01}	4.11×10^{-01}
METHYLGLYOXAL	3.88×10^{-01}	4.74×10^{-02}	3.14×10^{-02}	6.60×10^{-01}	1.13
MYRISTIC ACID	1.22×10^{-03}	1.49×10^{-04}	9.89×10^{-05}	2.08×10^{-03}	3.55×10^{-03}
NAPHTHALENE	1.71×10^{-01}	2.09×10^{-02}	1.38×10^{-02}	2.91×10^{-01}	4.96×10^{-01}
N-BUTANE	8.73×10^{-01}	1.07×10^{-01}	7.07×10^{-02}	1.49	2.54
N-DODECANE	1.15×10^{-01}	1.40×10^{-02}	9.28×10^{-03}	1.95×10^{-01}	3.33×10^{-01}
N-HENEICOSANE	1.50×10^{-02}	1.83×10^{-03}	1.21×10^{-03}	2.55×10^{-02}	4.36×10^{-02}
N-HEPTANE	1.07×10^{-01}	1.31×10^{-02}	8.67×10^{-03}	1.82×10^{-01}	3.11×10^{-01}
NICKEL AND COMPOUNDS	9.42×10^{-02}	1.15×10^{-02}	7.63×10^{-03}	1.60×10^{-01}	2.74×10^{-01}
NITRIC OXIDE	$4.94 \times 10^{+02}$	$6.03 \times 10^{+01}$	$3.99 \times 10^{+01}$	$8.40 \times 10^{+02}$	$1.43 \times 10^{+03}$
NITROGEN DIOXIDE	$3.98 \times 10^{+01}$	4.87	3.22	$6.78 \times 10^{+01}$	$1.16 \times 10^{+02}$
N-NONANE	3.65×10^{-02}	4.46×10^{-03}	2.95×10^{-03}	6.21×10^{-02}	1.06×10^{-01}
N-NONYLCYCLOHEXANE	5.65×10^{-03}	6.90×10^{-04}	4.57×10^{-04}	9.61×10^{-03}	1.64×10^{-02}
N-OCTANE	5.93×10^{-02}	7.25×10^{-03}	4.80×10^{-03}	1.01×10^{-01}	1.72×10^{-01}
NONADECANE	9.37×10^{-02}	1.15×10^{-02}	7.58×10^{-03}	1.60×10^{-01}	2.72×10^{-01}
NONANOIC ACID	5.47×10^{-02}	6.69×10^{-03}	4.43×10^{-03}	9.32×10^{-02}	1.59×10^{-01}
N-PENTANE	4.24×10^{-01}	5.18×10^{-02}	3.43×10^{-02}	7.22×10^{-01}	1.23
N-PROPYLBENZENE	2.28×10^{-02}	2.79×10^{-03}	1.84×10^{-03}	3.88×10^{-02}	6.62×10^{-02}
N-TRIDECANE	1.09×10^{-01}	1.33×10^{-02}	8.80×10^{-03}	1.85×10^{-01}	3.16×10^{-01}
OCTADECANE	1.37×10^{-01}	1.67×10^{-02}	1.11×10^{-02}	2.33×10^{-01}	3.98×10^{-01}
OCTANAL	7.07×10^{-01}	8.64×10^{-02}	5.72×10^{-02}	1.20	2.05
OCTANOIC ACID	2.85×10^{-02}	3.48×10^{-03}	2.31×10^{-03}	4.85×10^{-02}	8.28×10^{-02}
OCTYLCYCLOHEXANE	5.98×10^{-03}	7.31×10^{-04}	4.84×10^{-04}	1.02×10^{-02}	1.74×10^{-02}
OXIDES OF NITROGEN	$7.97 \times 10^{+02}$	$9.74 \times 10^{+01}$	$6.45 \times 10^{+01}$	$1.36 \times 10^{+03}$	$2.31 \times 10^{+03}$
PARTICULATE MATTER < 10 µm	$1.72 \times 10^{+01}$	2.10	1.39	$2.92 \times 10^{+01}$	$4.99 \times 10^{+01}$
PARTICULATE MATTER < 2.5 µm	$1.63 \times 10^{+01}$	1.99	1.32	$2.77 \times 10^{+01}$	$4.72 \times 10^{+01}$
PENTADECANE	9.07×10^{-02}	1.11×10^{-02}	7.34×10^{-03}	1.54×10^{-01}	2.64×10^{-01}
PENTYLCYCLOHEXANE	1.91×10^{-02}	2.34×10^{-03}	1.55×10^{-03}	3.26×10^{-02}	5.56×10^{-02}
PHENANTHRENE	1.52×10^{-02}	1.86×10^{-03}	1.23×10^{-03}	2.59×10^{-02}	4.42×10^{-02}
POLYCHLORINATED DIOXINS AND FURANS	1.12×10^{-07}	1.37×10^{-08}	9.04×10^{-09}	1.90×10^{-07}	3.25×10^{-07}
POLYCYCLIC AROMATIC HYDROCARBONS	3.31×10^{-01}	4.04×10^{-02}	2.68×10^{-02}	5.63×10^{-01}	9.61×10^{-01}
PROPIONALDEHYDE	3.19	3.90×10^{-01}	2.58×10^{-01}	5.43	9.27
PROPYLENE	1.78×10^{-01}	2.17×10^{-02}	1.44×10^{-02}	3.03×10^{-01}	5.17×10^{-01}
PYRENE	1.53×10^{-03}	1.87×10^{-04}	1.24×10^{-04}	2.60×10^{-03}	4.44×10^{-03}
RETENE	1.76×10^{-03}	2.15×10^{-04}	1.42×10^{-04}	3.00×10^{-03}	5.11×10^{-03}
SELENIUM AND COMPOUNDS	2.49×10^{-03}	3.04×10^{-04}	2.01×10^{-04}	4.24×10^{-03}	7.23×10^{-03}
SULFUR DIOXIDE	$1.90 \times 10^{+01}$	2.32	1.53	$3.23 \times 10^{+01}$	$5.51 \times 10^{+01}$
TETRADECANE	1.43×10^{-01}	1.75×10^{-02}	1.16×10^{-02}	2.44×10^{-01}	4.17×10^{-01}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
TOLUENE	9.07×10^{-01}	1.11×10^{-01}	7.34×10^{-02}	1.54	2.64
TOTAL SUSPENDED PARTICULATES	$1.81 \times 10^{+01}$	2.21	1.46	$3.08 \times 10^{+01}$	$5.25 \times 10^{+01}$
TOTAL VOCS	$4.22 \times 10^{+01}$	5.16	3.42	$7.18 \times 10^{+01}$	$1.23 \times 10^{+02}$
TRANS-2-BUTENE	1.19×10^{-01}	1.45×10^{-02}	9.59×10^{-03}	2.02×10^{-01}	3.44×10^{-01}
TRANS-2-HEXENE	3.65×10^{-02}	4.46×10^{-03}	2.95×10^{-03}	6.21×10^{-02}	1.06×10^{-01}
TRANS-2-PENTENE	1.14×10^{-02}	1.40×10^{-03}	9.24×10^{-04}	1.94×10^{-02}	3.32×10^{-02}
TRIDECANOIC ACID	2.99×10^{-03}	3.66×10^{-04}	2.42×10^{-04}	5.09×10^{-03}	8.69×10^{-03}
UNDECANOIC ACID	4.70×10^{-02}	5.74×10^{-03}	3.80×10^{-03}	8.00×10^{-02}	1.37×10^{-01}
ZINC AND COMPOUNDS	1.12×10^{-02}	1.36×10^{-03}	9.03×10^{-04}	1.90×10^{-02}	3.24×10^{-02}

Table C1.8: Annual Emissions from Commercial Off-Road Vehicles and Equipment – 4-Stroke Petrol

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
1,1,1-TRICHLOROETHANE	3.21×10^{-03}	3.83×10^{-04}	1.33×10^{-04}	3.64×10^{-03}	7.37×10^{-03}
1,1,2-TRICHLOROETHANE	2.62×10^{-03}	3.12×10^{-04}	1.08×10^{-04}	2.96×10^{-03}	6.00×10^{-03}
1,2,3-TRIMETHYLBENZENE	4.34×10^{-02}	5.18×10^{-03}	1.79×10^{-03}	4.92×10^{-02}	9.95×10^{-02}
1,2,4-TRIMETHYLBENZENE	1.55×10^{-01}	1.85×10^{-02}	6.41×10^{-03}	1.76×10^{-01}	3.56×10^{-01}
1,2-DIETHYLBENZENE	3.59×10^{-02}	4.28×10^{-03}	1.48×10^{-03}	4.07×10^{-02}	8.23×10^{-02}
1,3,5-TRIMETHYLBENZENE	1.18×10^{-01}	1.41×10^{-02}	4.89×10^{-03}	1.34×10^{-01}	2.72×10^{-01}
1,3-BUTADIENE	6.69×10^{-02}	7.97×10^{-03}	2.76×10^{-03}	7.57×10^{-02}	1.53×10^{-01}
1,4-BUTANEDIOL	2.99×10^{-04}	3.57×10^{-05}	1.23×10^{-05}	3.39×10^{-04}	6.86×10^{-04}
1-BUTENE	2.99×10^{-03}	3.57×10^{-04}	1.23×10^{-04}	3.39×10^{-03}	6.86×10^{-03}
1-BUTYNE	1.50×10^{-04}	1.78×10^{-05}	6.17×10^{-06}	1.69×10^{-04}	3.43×10^{-04}
1-CHLOROBUTANE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
1-DECENE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
1-HEXENE	1.18×10^{-02}	1.41×10^{-03}	4.87×10^{-04}	1.34×10^{-02}	2.70×10^{-02}
1-METHYL-3-ISOPROPYLBENZENE	2.73×10^{-02}	3.26×10^{-03}	1.13×10^{-03}	3.10×10^{-02}	6.27×10^{-02}
1-METHYL-3-PROPYLBENZENE	2.09×10^{-02}	2.49×10^{-03}	8.63×10^{-04}	2.37×10^{-02}	4.79×10^{-02}
1-PENTENE	1.02×10^{-02}	1.21×10^{-03}	4.20×10^{-04}	1.15×10^{-02}	2.33×10^{-02}
2,2,4-TRIMETHYLPENTANE	1.35×10^{-01}	1.61×10^{-02}	5.58×10^{-03}	1.53×10^{-01}	3.10×10^{-01}
2,2,5-TRIMETHYLHEXANE	2.57×10^{-02}	3.07×10^{-03}	1.06×10^{-03}	2.91×10^{-02}	5.90×10^{-02}
2,2-DICHLORONITROANILINE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
2,2-DIMETHYLBUTANE	3.80×10^{-02}	4.54×10^{-03}	1.57×10^{-03}	4.31×10^{-02}	8.72×10^{-02}
2,2-DIMETHYLHEXANE	3.75×10^{-03}	4.47×10^{-04}	1.55×10^{-04}	4.25×10^{-03}	8.60×10^{-03}
2,3,3-TRIMETHYLPENTANE	5.89×10^{-02}	7.03×10^{-03}	2.43×10^{-03}	6.68×10^{-02}	1.35×10^{-01}
2,3,4-TRIMETHYLPENTANE	5.89×10^{-03}	7.03×10^{-04}	2.43×10^{-04}	6.68×10^{-03}	1.35×10^{-02}
2,3,5-TRIMETHYLHEXANE	5.89×10^{-03}	7.03×10^{-04}	2.43×10^{-04}	6.68×10^{-03}	1.35×10^{-02}
2,3-DIMETHYLBUTANE	2.84×10^{-02}	3.39×10^{-03}	1.17×10^{-03}	3.22×10^{-02}	6.51×10^{-02}
2,3-DIMETHYLPENTANE	6.70×10^{-02}	7.99×10^{-03}	2.76×10^{-03}	7.59×10^{-02}	1.54×10^{-01}
2,4,4-TRIMETHYL-1-PENTENE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
2,4,5-TRIMETHYLHEPTANE	2.41×10^{-02}	2.88×10^{-03}	9.95×10^{-04}	2.73×10^{-02}	5.53×10^{-02}
2,4-DIMETHYLHEPTANE	6.96×10^{-03}	8.31×10^{-04}	2.88×10^{-04}	7.89×10^{-03}	1.60×10^{-02}
2,4-DIMETHYLHEXANE	4.49×10^{-04}	5.35×10^{-05}	1.85×10^{-05}	5.08×10^{-04}	1.03×10^{-03}
2,4-DIMETHYLOCTANE	5.36×10^{-03}	6.39×10^{-04}	2.21×10^{-04}	6.07×10^{-03}	1.23×10^{-02}
2,4-DIMETHYLPENTANE	2.84×10^{-02}	3.39×10^{-03}	1.17×10^{-03}	3.22×10^{-02}	6.51×10^{-02}
2,5-DIMETHYLHEXANE	3.38×10^{-02}	4.03×10^{-03}	1.39×10^{-03}	3.82×10^{-02}	7.74×10^{-02}
2-BUTYNE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
2-FURFURAL	2.77×10^{-03}	3.30×10^{-04}	1.14×10^{-04}	3.13×10^{-03}	6.34×10^{-03}
2-HEXENE	4.29×10^{-03}	5.11×10^{-04}	1.77×10^{-04}	4.86×10^{-03}	9.83×10^{-03}
2-METHYL-1-BUTENE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
2-METHYL-2-BUTENE	2.73×10^{-02}	3.26×10^{-03}	1.13×10^{-03}	3.10×10^{-02}	6.27×10^{-02}
2-METHYL-2-PENTENE	1.23×10^{-02}	1.47×10^{-03}	5.09×10^{-04}	1.40×10^{-02}	2.83×10^{-02}
2-METHYL-3-HEXANONE	5.23×10^{-04}	6.24×10^{-05}	2.16×10^{-05}	5.93×10^{-04}	1.20×10^{-03}
2-METHYLDECANE	7.07×10^{-02}	8.43×10^{-03}	2.92×10^{-03}	8.01×10^{-02}	1.62×10^{-01}
2-METHYLHEPTANE	1.18×10^{-02}	1.41×10^{-03}	4.87×10^{-04}	1.34×10^{-02}	2.70×10^{-02}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
2-METHYLOCTANE	1.07×10^{-03}	1.28×10^{-04}	4.42×10^{-05}	1.21×10^{-03}	2.46×10^{-03}
2-METHYLPENTANE	6.80×10^{-02}	8.11×10^{-03}	2.81×10^{-03}	7.71×10^{-02}	1.56×10^{-01}
3,4-DIMETHYLOCTANE	5.14×10^{-02}	6.13×10^{-03}	2.12×10^{-03}	5.83×10^{-02}	1.18×10^{-01}
3-METHYL-1-BUTENE	9.64×10^{-03}	1.15×10^{-03}	3.98×10^{-04}	1.09×10^{-02}	2.21×10^{-02}
3-METHYLHEPTANE	1.93×10^{-02}	2.30×10^{-03}	7.96×10^{-04}	2.19×10^{-02}	4.42×10^{-02}
3-METHYLHEXANE	4.93×10^{-02}	5.88×10^{-03}	2.03×10^{-03}	5.58×10^{-02}	1.13×10^{-01}
3-METHYLPENTANE	4.61×10^{-02}	5.50×10^{-03}	1.90×10^{-03}	5.22×10^{-02}	1.06×10^{-01}
4-METHYL-1-PENTENE	1.34×10^{-02}	1.60×10^{-03}	5.53×10^{-04}	1.52×10^{-02}	3.07×10^{-02}
4-METHYLANILINE	2.24×10^{-04}	2.67×10^{-05}	9.26×10^{-06}	2.54×10^{-04}	5.14×10^{-04}
4-METHYLHEPTANE	2.79×10^{-02}	3.32×10^{-03}	1.15×10^{-03}	3.16×10^{-02}	6.39×10^{-02}
ACENAPHTHENE	2.67×10^{-04}	3.19×10^{-05}	1.10×10^{-05}	3.03×10^{-04}	6.14×10^{-04}
ACENAPHTHYLENE	7.13×10^{-04}	8.51×10^{-05}	2.95×10^{-05}	8.08×10^{-04}	1.64×10^{-03}
ACETALDEHYDE	2.88×10^{-02}	3.43×10^{-03}	1.19×10^{-03}	3.26×10^{-02}	6.60×10^{-02}
ACETIC ACID	5.46×10^{-03}	6.51×10^{-04}	2.25×10^{-04}	6.18×10^{-03}	1.25×10^{-02}
ACETIC ANHYDRIDE	2.62×10^{-03}	3.12×10^{-04}	1.08×10^{-04}	2.96×10^{-03}	6.00×10^{-03}
ACETONE	1.10×10^{-02}	1.31×10^{-03}	4.54×10^{-04}	1.25×10^{-02}	2.52×10^{-02}
ACETYLENE	1.21×10^{-01}	1.44×10^{-02}	4.98×10^{-03}	1.37×10^{-01}	2.76×10^{-01}
ACROLEIN	4.91×10^{-03}	5.86×10^{-04}	2.03×10^{-04}	5.57×10^{-03}	1.13×10^{-02}
ACRYLIC ACID	3.36×10^{-03}	4.01×10^{-04}	1.39×10^{-04}	3.81×10^{-03}	7.72×10^{-03}
ACRYLONITRILE	4.34×10^{-03}	5.17×10^{-04}	1.79×10^{-04}	4.91×10^{-03}	9.94×10^{-03}
ADIPIC ACID	2.99×10^{-03}	3.57×10^{-04}	1.23×10^{-04}	3.39×10^{-03}	6.86×10^{-03}
ALIPHATICS	7.48×10^{-04}	8.92×10^{-05}	3.09×10^{-05}	8.47×10^{-04}	1.71×10^{-03}
ALKENE KETONE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
ALPHA-PINENE	2.62×10^{-03}	3.12×10^{-04}	1.08×10^{-04}	2.96×10^{-03}	6.00×10^{-03}
ANILINE	5.91×10^{-03}	7.04×10^{-04}	2.44×10^{-04}	6.69×10^{-03}	1.35×10^{-02}
ANTHRACENE	2.76×10^{-04}	3.29×10^{-05}	1.14×10^{-05}	3.12×10^{-04}	6.32×10^{-04}
ANTHRAQUINONE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
BENZALDEHYDE	1.29×10^{-02}	1.53×10^{-03}	5.31×10^{-04}	1.46×10^{-02}	2.95×10^{-02}
BENZENE	3.68×10^{-01}	4.39×10^{-02}	1.52×10^{-02}	4.17×10^{-01}	8.45×10^{-01}
BENZO(A)ANTHRACENE	1.08×10^{-04}	1.29×10^{-05}	4.46×10^{-06}	1.23×10^{-04}	2.48×10^{-04}
BENZO(A)PYRENE	2.30×10^{-04}	2.75×10^{-05}	9.51×10^{-06}	2.61×10^{-04}	5.28×10^{-04}
BENZO(B)FLUORANTHENE	1.21×10^{-04}	1.45×10^{-05}	5.00×10^{-06}	1.37×10^{-04}	2.78×10^{-04}
BENZO(E)PYRENE	9.13×10^{-04}	1.09×10^{-04}	3.77×10^{-05}	1.03×10^{-03}	2.09×10^{-03}
BENZO(G,H,I,)PERYLENE	3.92×10^{-05}	4.68×10^{-06}	1.62×10^{-06}	4.44×10^{-05}	8.99×10^{-05}
BENZO(K)FLUORANTHENE	9.59×10^{-05}	1.14×10^{-05}	3.96×10^{-06}	1.09×10^{-04}	2.20×10^{-04}
BENZOIC ACID	2.99×10^{-04}	3.57×10^{-05}	1.23×10^{-05}	3.39×10^{-04}	6.86×10^{-04}
BENZYL CHLORIDE	3.14×10^{-03}	3.74×10^{-04}	1.30×10^{-04}	3.56×10^{-03}	7.20×10^{-03}
BETA-PINENE	1.72×10^{-03}	2.05×10^{-04}	7.10×10^{-05}	1.95×10^{-03}	3.94×10^{-03}
BIPHENYL	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
B-PHELLANDRENE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
BROMODINITROBENZENE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
BUTOXYBUTENE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
BUTOXYETHOXYETHANOL ACETATE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
BUTYL ACRYLATE	3.21×10^{-03}	3.83×10^{-04}	1.33×10^{-04}	3.64×10^{-03}	7.37×10^{-03}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
BUTYL BENZOATE	1.57×10^{-03}	1.87×10^{-04}	6.48×10^{-05}	1.78×10^{-03}	3.60×10^{-03}
BUTYL CARBITOL	2.92×10^{-03}	3.48×10^{-04}	1.20×10^{-04}	3.30×10^{-03}	6.69×10^{-03}
BUTYL CELLOSOLVE	3.29×10^{-03}	3.92×10^{-04}	1.36×10^{-04}	3.73×10^{-03}	7.54×10^{-03}
BUTYLCYCLOHEXANE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
BUTYLISOPROPYLPHTHALATE	3.74×10^{-04}	4.46×10^{-05}	1.54×10^{-05}	4.23×10^{-04}	8.57×10^{-04}
BUTYRALDEHYDE	3.29×10^{-03}	3.92×10^{-04}	1.36×10^{-04}	3.73×10^{-03}	7.54×10^{-03}
C10 AROMATIC	1.42×10^{-01}	1.69×10^{-02}	5.86×10^{-03}	1.61×10^{-01}	3.26×10^{-01}
C10 OLEFINS	2.24×10^{-04}	2.67×10^{-05}	9.26×10^{-06}	2.54×10^{-04}	5.14×10^{-04}
C10 PARAFFINS	1.02×10^{-02}	1.21×10^{-03}	4.20×10^{-04}	1.15×10^{-02}	2.33×10^{-02}
C2 ALKYL INDAN	2.99×10^{-04}	3.57×10^{-05}	1.23×10^{-05}	3.39×10^{-04}	6.86×10^{-04}
C2 CYCLOHEXANE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
C3 CYCLOHEXANE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
C3/C4/C5 ALKYLBENZENES	2.24×10^{-04}	2.67×10^{-05}	9.26×10^{-06}	2.54×10^{-04}	5.14×10^{-04}
C-3-HEXENE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
C4 SUBSTITUTED CYCLOHEXANE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
C4 SUBSTITUTED CYCLOHEXANONE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
C5 ESTER	1.50×10^{-04}	1.78×10^{-05}	6.17×10^{-06}	1.69×10^{-04}	3.43×10^{-04}
C5 OLEFIN	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
C5 PARAFFIN	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
C5 SUBSTITUTED CYCLOHEXANE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
C6 SUBSTITUTED CYCLOHEXANE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
C6H18O3SI3	6.73×10^{-04}	8.02×10^{-05}	2.78×10^{-05}	7.62×10^{-04}	1.54×10^{-03}
C-7 CYCLOPARAFFINS	5.31×10^{-03}	6.33×10^{-04}	2.19×10^{-04}	6.01×10^{-03}	1.22×10^{-02}
C7-C16 PARAFFINS	1.12×10^{-03}	1.34×10^{-04}	4.63×10^{-05}	1.27×10^{-03}	2.57×10^{-03}
C-8 CYCLOPARAFFINS	3.74×10^{-04}	4.46×10^{-05}	1.54×10^{-05}	4.23×10^{-04}	8.57×10^{-04}
C8 PARAFFIN	1.50×10^{-04}	1.78×10^{-05}	6.17×10^{-06}	1.69×10^{-04}	3.43×10^{-04}
C8H24O4SI4	2.24×10^{-04}	2.67×10^{-05}	9.26×10^{-06}	2.54×10^{-04}	5.14×10^{-04}
CAMPHENE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
CARBITOL	3.44×10^{-03}	4.10×10^{-04}	1.42×10^{-04}	3.90×10^{-03}	7.89×10^{-03}
CARBON MONOXIDE	$1.01 \times 10^{+02}$	$1.21 \times 10^{+01}$	4.19	$1.15 \times 10^{+02}$	$2.33 \times 10^{+02}$
CARBON SULFIDE	6.73×10^{-04}	8.02×10^{-05}	2.78×10^{-05}	7.62×10^{-04}	1.54×10^{-03}
CARBON TETRACHLORIDE	4.86×10^{-03}	5.79×10^{-04}	2.01×10^{-04}	5.51×10^{-03}	1.11×10^{-02}
CARBONYL SULFIDE	2.24×10^{-04}	2.67×10^{-05}	9.26×10^{-06}	2.54×10^{-04}	5.14×10^{-04}
CELLOSOLVE	2.69×10^{-03}	3.21×10^{-04}	1.11×10^{-04}	3.05×10^{-03}	6.17×10^{-03}
CELLOSOLVE ACETATE	2.69×10^{-03}	3.21×10^{-04}	1.11×10^{-04}	3.05×10^{-03}	6.17×10^{-03}
CHLOROBENZENE	5.31×10^{-03}	6.33×10^{-04}	2.19×10^{-04}	6.01×10^{-03}	1.22×10^{-02}
CHLORODIFLUOROMETHANE	1.20×10^{-03}	1.43×10^{-04}	4.94×10^{-05}	1.36×10^{-03}	2.74×10^{-03}
CHLOROFORM	3.81×10^{-03}	4.55×10^{-04}	1.57×10^{-04}	4.32×10^{-03}	8.74×10^{-03}
CHLOROPENTAFLUOROETHANE	1.50×10^{-04}	1.78×10^{-05}	6.17×10^{-06}	1.69×10^{-04}	3.43×10^{-04}
CHLOROPRENE	2.54×10^{-03}	3.03×10^{-04}	1.05×10^{-04}	2.88×10^{-03}	5.83×10^{-03}
CHLOROTRIFLUOROMETHANE	3.74×10^{-04}	4.46×10^{-05}	1.54×10^{-05}	4.23×10^{-04}	8.57×10^{-04}
CHROMIUM (III) COMPOUNDS	6.40×10^{-06}	7.63×10^{-07}	2.64×10^{-07}	7.25×10^{-06}	1.47×10^{-05}
CHROMIUM (VI) COMPOUNDS	2.74×10^{-06}	3.27×10^{-07}	1.13×10^{-07}	3.11×10^{-06}	6.29×10^{-06}
CHRYSENE	1.03×10^{-04}	1.23×10^{-05}	4.26×10^{-06}	1.17×10^{-04}	2.37×10^{-04}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
CIS-2-BUTENE	2.46×10^{-02}	2.94×10^{-03}	1.02×10^{-03}	2.79×10^{-02}	5.65×10^{-02}
CIS-2-PENTENE	1.07×10^{-02}	1.28×10^{-03}	4.42×10^{-04}	1.21×10^{-02}	2.46×10^{-02}
COPPER AND COMPOUNDS	2.74×10^{-05}	3.27×10^{-06}	1.13×10^{-06}	3.11×10^{-05}	6.29×10^{-05}
CORONENE	2.39×10^{-05}	2.85×10^{-06}	9.86×10^{-07}	2.70×10^{-05}	5.48×10^{-05}
CREOSOTE	2.77×10^{-03}	3.30×10^{-04}	1.14×10^{-04}	3.13×10^{-03}	6.34×10^{-03}
CRESOL	2.84×10^{-03}	3.39×10^{-04}	1.17×10^{-04}	3.22×10^{-03}	6.52×10^{-03}
CROTONALDEHYDE	3.75×10^{-03}	4.47×10^{-04}	1.55×10^{-04}	4.25×10^{-03}	8.60×10^{-03}
CYCLOHEXANE	8.68×10^{-02}	1.04×10^{-02}	3.58×10^{-03}	9.83×10^{-02}	1.99×10^{-01}
CYCLOHEXANOL	3.36×10^{-03}	4.01×10^{-04}	1.39×10^{-04}	3.81×10^{-03}	7.72×10^{-03}
CYCLOHEXANONE	3.96×10^{-03}	4.73×10^{-04}	1.64×10^{-04}	4.49×10^{-03}	9.09×10^{-03}
CYCLOHEXENE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
CYCLOPENTA(C,D)PYRENE	2.69×10^{-04}	3.21×10^{-05}	1.11×10^{-05}	3.05×10^{-04}	6.17×10^{-04}
CYCLOPENTANE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
CYCLOPENTENE	1.45×10^{-02}	1.73×10^{-03}	5.97×10^{-04}	1.64×10^{-02}	3.32×10^{-02}
DENATURANT	7.48×10^{-04}	8.92×10^{-05}	3.09×10^{-05}	8.47×10^{-04}	1.71×10^{-03}
DIBENZO(A,H)ANTHRACENE	1.31×10^{-04}	1.57×10^{-05}	5.42×10^{-06}	1.49×10^{-04}	3.01×10^{-04}
DIBUTYL PHTHALATE	2.99×10^{-04}	3.57×10^{-05}	1.23×10^{-05}	3.39×10^{-04}	6.86×10^{-04}
DICHLOROBENZENES	1.50×10^{-04}	1.78×10^{-05}	6.17×10^{-06}	1.69×10^{-04}	3.43×10^{-04}
DICHLORODIFLUOROMETHANE	2.62×10^{-03}	3.12×10^{-04}	1.08×10^{-04}	2.96×10^{-03}	6.00×10^{-03}
DICHLOROMETHANE	5.61×10^{-03}	6.69×10^{-04}	2.31×10^{-04}	6.35×10^{-03}	1.29×10^{-02}
DICHLOROTETRAFLUORETHANE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
DIETHYLCYCLOHEXANE	2.24×10^{-04}	2.67×10^{-05}	9.26×10^{-06}	2.54×10^{-04}	5.14×10^{-04}
DIETHYLENE GLYCOL	3.29×10^{-03}	3.92×10^{-04}	1.36×10^{-04}	3.73×10^{-03}	7.54×10^{-03}
DIISOPROPYL BENZENE	2.84×10^{-03}	3.39×10^{-04}	1.17×10^{-04}	3.22×10^{-03}	6.52×10^{-03}
DIMETHYL FORMAMIDE	2.69×10^{-03}	3.21×10^{-04}	1.11×10^{-04}	3.05×10^{-03}	6.17×10^{-03}
DIMETHYL PHTHALATE	4.49×10^{-04}	5.35×10^{-05}	1.85×10^{-05}	5.08×10^{-04}	1.03×10^{-03}
DIMETHYLCYCLOHEXANE	3.74×10^{-04}	4.46×10^{-05}	1.54×10^{-05}	4.23×10^{-04}	8.57×10^{-04}
DIMETHYLCYCLOPENTANE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
DIMETHYLETHER	8.37×10^{-03}	9.99×10^{-04}	3.46×10^{-04}	9.49×10^{-03}	1.92×10^{-02}
DIMETHYLHEXENE	6.96×10^{-03}	8.31×10^{-04}	2.88×10^{-04}	7.89×10^{-03}	1.60×10^{-02}
DIMETHYLOCTANES	2.24×10^{-04}	2.67×10^{-05}	9.26×10^{-06}	2.54×10^{-04}	5.14×10^{-04}
DIPROPYLENE GLYCOL	4.93×10^{-03}	5.88×10^{-04}	2.04×10^{-04}	5.59×10^{-03}	1.13×10^{-02}
D-LIMONENE	3.74×10^{-04}	4.46×10^{-05}	1.54×10^{-05}	4.23×10^{-04}	8.57×10^{-04}
DODECENE	3.74×10^{-03}	4.46×10^{-04}	1.54×10^{-04}	4.23×10^{-03}	8.57×10^{-03}
EPICHLOROHYDRIN	3.14×10^{-03}	3.74×10^{-04}	1.30×10^{-04}	3.56×10^{-03}	7.20×10^{-03}
ETHANE	9.59×10^{-02}	1.14×10^{-02}	3.96×10^{-03}	1.09×10^{-01}	2.20×10^{-01}
ETHANOLAMINE	3.29×10^{-03}	3.92×10^{-04}	1.36×10^{-04}	3.73×10^{-03}	7.54×10^{-03}
ETHYL ACETATE	3.29×10^{-03}	3.92×10^{-04}	1.36×10^{-04}	3.73×10^{-03}	7.54×10^{-03}
ETHYL ACRYLATE	3.74×10^{-03}	4.46×10^{-04}	1.54×10^{-04}	4.23×10^{-03}	8.57×10^{-03}
ETHYL ALCOHOL	1.02×10^{-02}	1.21×10^{-03}	4.20×10^{-04}	1.15×10^{-02}	2.33×10^{-02}
ETHYL CHLORIDE	2.17×10^{-03}	2.59×10^{-04}	8.95×10^{-05}	2.46×10^{-03}	4.97×10^{-03}
ETHYL ETHER	4.63×10^{-03}	5.53×10^{-04}	1.91×10^{-04}	5.25×10^{-03}	1.06×10^{-02}
ETHYL MERCAPTAN	2.47×10^{-03}	2.94×10^{-04}	1.02×10^{-04}	2.79×10^{-03}	5.66×10^{-03}
ETHYL STYRENE	2.24×10^{-04}	2.67×10^{-05}	9.26×10^{-06}	2.54×10^{-04}	5.14×10^{-04}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
ETHYLBENZENE	1.39×10^{-01}	1.66×10^{-02}	5.75×10^{-03}	1.58×10^{-01}	3.19×10^{-01}
ETHYLCYCLOHEXANE	1.50×10^{-04}	1.78×10^{-05}	6.17×10^{-06}	1.69×10^{-04}	3.43×10^{-04}
ETHYLCYCLOPENTANE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
ETHYLENE	4.51×10^{-01}	5.37×10^{-02}	1.86×10^{-02}	5.11×10^{-01}	1.03
ETHYLENE DIBROMIDE	3.14×10^{-03}	3.74×10^{-04}	1.30×10^{-04}	3.56×10^{-03}	7.20×10^{-03}
ETHYLENE DICHLORIDE	4.34×10^{-03}	5.17×10^{-04}	1.79×10^{-04}	4.91×10^{-03}	9.94×10^{-03}
ETHYLENE GLYCOL	2.77×10^{-03}	3.30×10^{-04}	1.14×10^{-04}	3.13×10^{-03}	6.34×10^{-03}
ETHYLENE OXIDE	2.84×10^{-03}	3.39×10^{-04}	1.17×10^{-04}	3.22×10^{-03}	6.52×10^{-03}
ETHYLENEAMINES	3.29×10^{-03}	3.92×10^{-04}	1.36×10^{-04}	3.73×10^{-03}	7.54×10^{-03}
ETHYLHEPTENE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
ETHYLHEXANE	1.50×10^{-04}	1.78×10^{-05}	6.17×10^{-06}	1.69×10^{-04}	3.43×10^{-04}
ETHYLISOPROPYL ETHER	1.50×10^{-04}	1.78×10^{-05}	6.17×10^{-06}	1.69×10^{-04}	3.43×10^{-04}
ETHYLMETHYLCYCLOHEXANES	1.50×10^{-04}	1.78×10^{-05}	6.17×10^{-06}	1.69×10^{-04}	3.43×10^{-04}
ETHYL-PHENYL-PHENYL-ETHANE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
ETHYLTOLUENE	1.50×10^{-04}	1.78×10^{-05}	6.17×10^{-06}	1.69×10^{-04}	3.43×10^{-04}
FLUORANTHENE	4.41×10^{-04}	5.25×10^{-05}	1.82×10^{-05}	4.99×10^{-04}	1.01×10^{-03}
FLUORENE	7.75×10^{-04}	9.24×10^{-05}	3.20×10^{-05}	8.78×10^{-04}	1.78×10^{-03}
FORMALDEHYDE	1.20×10^{-01}	1.44×10^{-02}	4.97×10^{-03}	1.36×10^{-01}	2.76×10^{-01}
FORMIC ACID	3.14×10^{-03}	3.74×10^{-04}	1.30×10^{-04}	3.56×10^{-03}	7.20×10^{-03}
GLYOXAL	1.50×10^{-04}	1.78×10^{-05}	6.17×10^{-06}	1.69×10^{-04}	3.43×10^{-04}
HEPTENE	3.81×10^{-03}	4.55×10^{-04}	1.57×10^{-04}	4.32×10^{-03}	8.74×10^{-03}
HEXADECANE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
HEXAFLUOROETHANE	2.99×10^{-03}	3.57×10^{-04}	1.23×10^{-04}	3.39×10^{-03}	6.86×10^{-03}
HEXAMETHYLENEDIAMINE	5.01×10^{-03}	5.97×10^{-04}	2.07×10^{-04}	5.67×10^{-03}	1.15×10^{-02}
HEXYLENE GLYCOL	2.69×10^{-03}	3.21×10^{-04}	1.11×10^{-04}	3.05×10^{-03}	6.17×10^{-03}
INDANE	2.89×10^{-02}	3.45×10^{-03}	1.19×10^{-03}	3.28×10^{-02}	6.64×10^{-02}
INDENO(1,2,3-C,D)PYRENE	7.31×10^{-06}	8.72×10^{-07}	3.02×10^{-07}	8.28×10^{-06}	1.68×10^{-05}
ISOBUTANE	3.32×10^{-02}	3.96×10^{-03}	1.37×10^{-03}	3.76×10^{-02}	7.62×10^{-02}
ISOBUTYL ACRYLATE	2.84×10^{-03}	3.39×10^{-04}	1.17×10^{-04}	3.22×10^{-03}	6.52×10^{-03}
ISOBUTYL ALCOHOL	3.14×10^{-03}	3.74×10^{-04}	1.30×10^{-04}	3.56×10^{-03}	7.20×10^{-03}
ISOBUTYL ISOBUTYRATE	2.92×10^{-03}	3.48×10^{-04}	1.20×10^{-04}	3.30×10^{-03}	6.69×10^{-03}
ISOBUTYLBENZENE	2.63×10^{-02}	3.13×10^{-03}	1.08×10^{-03}	2.97×10^{-02}	6.02×10^{-02}
ISOBUTYLENE	7.55×10^{-02}	9.01×10^{-03}	3.12×10^{-03}	8.56×10^{-02}	1.73×10^{-01}
ISOBUTYRALDEHYDE	3.14×10^{-03}	3.74×10^{-04}	1.30×10^{-04}	3.56×10^{-03}	7.20×10^{-03}
ISOMERS OF BUTENE	3.74×10^{-04}	4.46×10^{-05}	1.54×10^{-05}	4.23×10^{-04}	8.57×10^{-04}
ISOMERS OF BUTYLBENZENE	4.49×10^{-04}	5.35×10^{-05}	1.85×10^{-05}	5.08×10^{-04}	1.03×10^{-03}
ISOMERS OF C10H18	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
ISOMERS OF DECANE	2.99×10^{-03}	3.57×10^{-04}	1.23×10^{-04}	3.39×10^{-03}	6.86×10^{-03}
ISOMERS OF DIETHYLBENZENE	2.24×10^{-04}	2.67×10^{-05}	9.26×10^{-06}	2.54×10^{-04}	5.14×10^{-04}
ISOMERS OF DODECANE	3.44×10^{-03}	4.10×10^{-04}	1.42×10^{-04}	3.90×10^{-03}	7.89×10^{-03}
ISOMERS OF ETHYLTOLUENE	2.99×10^{-04}	3.57×10^{-05}	1.23×10^{-05}	3.39×10^{-04}	6.86×10^{-04}
ISOMERS OF HEPTADECANE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
ISOMERS OF HEPTANE	1.87×10^{-03}	2.23×10^{-04}	7.72×10^{-05}	2.12×10^{-03}	4.29×10^{-03}
ISOMERS OF HEXANE	4.04×10^{-03}	4.81×10^{-04}	1.67×10^{-04}	4.57×10^{-03}	9.26×10^{-03}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
ISOMERS OF NONANE	1.42×10^{-03}	1.69×10^{-04}	5.86×10^{-05}	1.61×10^{-03}	3.26×10^{-03}
ISOMERS OF OCTADECANE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
ISOMERS OF OCTANE	1.12×10^{-03}	1.34×10^{-04}	4.63×10^{-05}	1.27×10^{-03}	2.57×10^{-03}
ISOMERS OF PENTADECANE	3.14×10^{-03}	3.74×10^{-04}	1.30×10^{-04}	3.56×10^{-03}	7.20×10^{-03}
ISOMERS OF PENTANE	8.30×10^{-03}	9.90×10^{-04}	3.43×10^{-04}	9.40×10^{-03}	1.90×10^{-02}
ISOMERS OF PENTENE	3.74×10^{-04}	4.46×10^{-05}	1.54×10^{-05}	4.23×10^{-04}	8.57×10^{-04}
ISOMERS OF PROPYLBENZENE	1.50×10^{-04}	1.78×10^{-05}	6.17×10^{-06}	1.69×10^{-04}	3.43×10^{-04}
ISOMERS OF TETRADECANE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
ISOMERS OF UNDECANE	3.74×10^{-04}	4.46×10^{-05}	1.54×10^{-05}	4.23×10^{-04}	8.57×10^{-04}
ISOMERS OF XYLENE	4.76×10^{-01}	5.68×10^{-02}	1.97×10^{-02}	5.39×10^{-01}	1.09
ISOPENTANE	1.88×10^{-01}	2.24×10^{-02}	7.76×10^{-03}	2.13×10^{-01}	4.31×10^{-01}
ISOPRENE	1.21×10^{-02}	1.44×10^{-03}	4.99×10^{-04}	1.37×10^{-02}	2.77×10^{-02}
ISOPROPYL ACETATE	3.51×10^{-03}	4.19×10^{-04}	1.45×10^{-04}	3.98×10^{-03}	8.06×10^{-03}
ISOPROPYL ALCOHOL	5.46×10^{-03}	6.51×10^{-04}	2.25×10^{-04}	6.18×10^{-03}	1.25×10^{-02}
ISOPROPYLBENZENE	2.84×10^{-03}	3.39×10^{-04}	1.17×10^{-04}	3.22×10^{-03}	6.52×10^{-03}
LACTOL SPIRITS	2.69×10^{-03}	3.21×10^{-04}	1.11×10^{-04}	3.05×10^{-03}	6.17×10^{-03}
LEAD AND COMPOUNDS	6.43×10^{-04}	7.67×10^{-05}	2.66×10^{-05}	7.29×10^{-04}	1.48×10^{-03}
MALEIC ANHYDRIDE	5.23×10^{-04}	6.24×10^{-05}	2.16×10^{-05}	5.93×10^{-04}	1.20×10^{-03}
MANGANESE AND COMPOUNDS	1.83×10^{-05}	2.18×10^{-06}	7.54×10^{-07}	2.07×10^{-05}	4.19×10^{-05}
M-DIETHYLBENZENE	3.05×10^{-02}	3.64×10^{-03}	1.26×10^{-03}	3.46×10^{-02}	7.00×10^{-02}
METHANE	5.88×10^{-01}	7.01×10^{-02}	2.43×10^{-02}	6.66×10^{-01}	1.35
METHYL ACETATE	5.31×10^{-03}	6.33×10^{-04}	2.19×10^{-04}	6.01×10^{-03}	1.22×10^{-02}
METHYL ACRYLATE	2.84×10^{-03}	3.39×10^{-04}	1.17×10^{-04}	3.22×10^{-03}	6.52×10^{-03}
METHYL ALCOHOL	1.05×10^{-02}	1.25×10^{-03}	4.32×10^{-04}	1.19×10^{-02}	2.40×10^{-02}
METHYL AMYL KETONE	3.81×10^{-03}	4.55×10^{-04}	1.57×10^{-04}	4.32×10^{-03}	8.74×10^{-03}
METHYL CARBITOL	2.92×10^{-03}	3.48×10^{-04}	1.20×10^{-04}	3.30×10^{-03}	6.69×10^{-03}
METHYL CELLOSOLVE	2.92×10^{-03}	3.48×10^{-04}	1.20×10^{-04}	3.30×10^{-03}	6.69×10^{-03}
METHYL ETHYL KETONE	9.12×10^{-03}	1.09×10^{-03}	3.77×10^{-04}	1.03×10^{-02}	2.09×10^{-02}
METHYL FORMATE	1.57×10^{-03}	1.87×10^{-04}	6.48×10^{-05}	1.78×10^{-03}	3.60×10^{-03}
METHYL GLYOXAL	1.50×10^{-04}	1.78×10^{-05}	6.17×10^{-06}	1.69×10^{-04}	3.43×10^{-04}
METHYL ISOBUTYL KETONE	4.19×10^{-03}	4.99×10^{-04}	1.73×10^{-04}	4.74×10^{-03}	9.60×10^{-03}
METHYL METHACRYLATE	3.44×10^{-03}	4.10×10^{-04}	1.42×10^{-04}	3.90×10^{-03}	7.89×10^{-03}
METHYL MYRISTATE	2.24×10^{-04}	2.67×10^{-05}	9.26×10^{-06}	2.54×10^{-04}	5.14×10^{-04}
METHYL NAPHTHALENES	2.99×10^{-04}	3.57×10^{-05}	1.23×10^{-05}	3.39×10^{-04}	6.86×10^{-04}
METHYL PALMITATE	5.98×10^{-04}	7.13×10^{-05}	2.47×10^{-05}	6.78×10^{-04}	1.37×10^{-03}
METHYL STEARATE	8.22×10^{-04}	9.81×10^{-05}	3.39×10^{-05}	9.32×10^{-04}	1.89×10^{-03}
METHYL STYRENE	3.06×10^{-03}	3.66×10^{-04}	1.27×10^{-04}	3.47×10^{-03}	7.03×10^{-03}
METHYL TERT-BUTYL ETHER	1.30	1.55×10^{-01}	5.35×10^{-02}	1.47	2.97
METHYLACETYLENE	9.11×10^{-03}	1.09×10^{-03}	3.76×10^{-04}	1.03×10^{-02}	2.09×10^{-02}
METHYLAL	1.27×10^{-03}	1.52×10^{-04}	5.25×10^{-05}	1.44×10^{-03}	2.91×10^{-03}
METHYLALLENE	2.99×10^{-03}	3.57×10^{-04}	1.23×10^{-04}	3.39×10^{-03}	6.86×10^{-03}
METHYLCYCLOHEXANE	2.52×10^{-02}	3.00×10^{-03}	1.04×10^{-03}	2.85×10^{-02}	5.78×10^{-02}
METHYLCYCLOPENTANE	3.27×10^{-02}	3.90×10^{-03}	1.35×10^{-03}	3.70×10^{-02}	7.50×10^{-02}
METHYLCYCLOPENTENE	1.07×10^{-03}	1.28×10^{-04}	4.42×10^{-05}	1.21×10^{-03}	2.46×10^{-03}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
METHYLDECANES	1.50×10^{-04}	1.78×10^{-05}	6.17×10^{-06}	1.69×10^{-04}	3.43×10^{-04}
METHYLENE BROMIDE	2.24×10^{-04}	2.67×10^{-05}	9.26×10^{-06}	2.54×10^{-04}	5.14×10^{-04}
METHYLHEXANE	2.24×10^{-04}	2.67×10^{-05}	9.26×10^{-06}	2.54×10^{-04}	5.14×10^{-04}
METHYLNONANE	1.50×10^{-04}	1.78×10^{-05}	6.17×10^{-06}	1.69×10^{-04}	3.43×10^{-04}
METHYLOCTANES	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
METHYLPENTANE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
METHYLPROPYLCYCLOHEXANES	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
M-ETHYLTOLUENE	6.70×10^{-02}	7.99×10^{-03}	2.76×10^{-03}	7.59×10^{-02}	1.54×10^{-01}
METHYLUNDECANE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
MINERAL SPIRITS	4.78×10^{-03}	5.71×10^{-04}	1.98×10^{-04}	5.42×10^{-03}	1.10×10^{-02}
MYRCENE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
NAPHTHA	3.51×10^{-03}	4.19×10^{-04}	1.45×10^{-04}	3.98×10^{-03}	8.06×10^{-03}
NAPHTHALENE	1.80×10^{-02}	2.15×10^{-03}	7.45×10^{-04}	2.04×10^{-02}	4.14×10^{-02}
N-BUTANE	2.18×10^{-01}	2.60×10^{-02}	8.99×10^{-03}	2.47×10^{-01}	4.99×10^{-01}
N-BUTYL ACETATE	4.34×10^{-03}	5.17×10^{-04}	1.79×10^{-04}	4.91×10^{-03}	9.94×10^{-03}
N-BUTYL ALCOHOL	5.16×10^{-03}	6.15×10^{-04}	2.13×10^{-04}	5.84×10^{-03}	1.18×10^{-02}
N-DECANE	1.07×10^{-02}	1.28×10^{-03}	4.42×10^{-04}	1.21×10^{-02}	2.46×10^{-02}
N-DODECANE	1.42×10^{-03}	1.69×10^{-04}	5.86×10^{-05}	1.61×10^{-03}	3.26×10^{-03}
N-HEPTANE	2.84×10^{-02}	3.39×10^{-03}	1.17×10^{-03}	3.22×10^{-02}	6.51×10^{-02}
N-HEXANE	6.97×10^{-02}	8.31×10^{-03}	2.88×10^{-03}	7.89×10^{-02}	1.60×10^{-01}
NICKEL AND COMPOUNDS	9.14×10^{-06}	1.09×10^{-06}	3.77×10^{-07}	1.04×10^{-05}	2.10×10^{-05}
NITRIC OXIDE	4.34	5.17×10^{-01}	1.79×10^{-01}	4.91	9.94
NITROBENZENE	2.47×10^{-03}	2.94×10^{-04}	1.02×10^{-04}	2.79×10^{-03}	5.66×10^{-03}
NITROGEN DIOXIDE	3.50×10^{-01}	4.17×10^{-02}	1.44×10^{-02}	3.96×10^{-01}	8.02×10^{-01}
N-NONANE	1.34×10^{-02}	1.60×10^{-03}	5.53×10^{-04}	1.52×10^{-02}	3.07×10^{-02}
N-OCTANE	1.61×10^{-02}	1.92×10^{-03}	6.64×10^{-04}	1.82×10^{-02}	3.69×10^{-02}
NONENONE	1.50×10^{-04}	1.78×10^{-05}	6.17×10^{-06}	1.69×10^{-04}	3.43×10^{-04}
N-PENTADECANE	1.27×10^{-03}	1.52×10^{-04}	5.25×10^{-05}	1.44×10^{-03}	2.91×10^{-03}
N-PENTANE	8.57×10^{-02}	1.02×10^{-02}	3.54×10^{-03}	9.71×10^{-02}	1.97×10^{-01}
N-PENTYLCYCLOHEXANE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
N-PROPYL ACETATE	3.66×10^{-03}	4.37×10^{-04}	1.51×10^{-04}	4.15×10^{-03}	8.40×10^{-03}
N-PROPYL ALCOHOL	3.14×10^{-03}	3.74×10^{-04}	1.30×10^{-04}	3.56×10^{-03}	7.20×10^{-03}
N-PROPYLBENZENE	3.00×10^{-02}	3.58×10^{-03}	1.24×10^{-03}	3.40×10^{-02}	6.88×10^{-02}
N-TETRADECANE	5.23×10^{-04}	6.24×10^{-05}	2.16×10^{-05}	5.93×10^{-04}	1.20×10^{-03}
N-TRIDECANE	7.48×10^{-04}	8.92×10^{-05}	3.09×10^{-05}	8.47×10^{-04}	1.71×10^{-03}
N-UNDECANE	3.21×10^{-02}	3.83×10^{-03}	1.33×10^{-03}	3.64×10^{-02}	7.37×10^{-02}
OCTAMETHYLCYCLOTETRASILOXANE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
O-DICHLOROBENZENE	2.99×10^{-03}	3.57×10^{-04}	1.23×10^{-04}	3.39×10^{-03}	6.86×10^{-03}
O-ETHYLTOLUENE	1.39×10^{-02}	1.66×10^{-03}	5.75×10^{-04}	1.58×10^{-02}	3.19×10^{-02}
OXIDES OF NITROGEN	7.00	8.34×10^{-01}	2.89×10^{-01}	7.93	$1.60 \times 10^{+01}$
PALMITIC ACID	1.50×10^{-03}	1.78×10^{-04}	6.17×10^{-05}	1.69×10^{-03}	3.43×10^{-03}
PARAFFINS (C16-C34)	1.50×10^{-04}	1.78×10^{-05}	6.17×10^{-06}	1.69×10^{-04}	3.43×10^{-04}
PARTICULATE MATTER < 10 µm	9.14×10^{-02}	1.09×10^{-02}	3.77×10^{-03}	1.04×10^{-01}	2.10×10^{-01}
PARTICULATE MATTER < 2.5 µm	8.41×10^{-02}	1.00×10^{-02}	3.47×10^{-03}	9.52×10^{-02}	1.93×10^{-01}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
P-DICHLOROBENZENE	5.38×10^{-03}	6.42×10^{-04}	2.22×10^{-04}	6.10×10^{-03}	1.23×10^{-02}
PHENANTHRENE	8.24×10^{-04}	9.83×10^{-05}	3.40×10^{-05}	9.34×10^{-04}	1.89×10^{-03}
PHENOL	3.29×10^{-03}	3.92×10^{-04}	1.36×10^{-04}	3.73×10^{-03}	7.54×10^{-03}
PHENYL ISOCYANATE	8.97×10^{-04}	1.07×10^{-04}	3.70×10^{-05}	1.02×10^{-03}	2.06×10^{-03}
PHTHALIC ANHYDRIDE	1.50×10^{-03}	1.78×10^{-04}	6.17×10^{-05}	1.69×10^{-03}	3.43×10^{-03}
PIPERYLENE	2.99×10^{-03}	3.57×10^{-04}	1.23×10^{-04}	3.39×10^{-03}	6.86×10^{-03}
POLYCHLORINATED DIOXINS AND FURANS	1.37×10^{-12}	1.64×10^{-13}	5.66×10^{-14}	1.55×10^{-12}	3.15×10^{-12}
POLYCYCLIC AROMATIC HYDROCARBONS	2.47×10^{-02}	2.95×10^{-03}	1.02×10^{-03}	2.80×10^{-02}	5.66×10^{-02}
PROPADIENE	6.96×10^{-03}	8.31×10^{-04}	2.88×10^{-04}	7.89×10^{-03}	1.60×10^{-02}
PROPANE	1.79×10^{-02}	2.14×10^{-03}	7.41×10^{-04}	2.03×10^{-02}	4.11×10^{-02}
PROPIONALDEHYDE	1.32×10^{-02}	1.57×10^{-03}	5.45×10^{-04}	1.50×10^{-02}	3.03×10^{-02}
PROPIONIC ACID	2.99×10^{-03}	3.57×10^{-04}	1.23×10^{-04}	3.39×10^{-03}	6.86×10^{-03}
PROPYLCYCLOHEXANE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
PROPYLENE	1.54×10^{-01}	1.84×10^{-02}	6.37×10^{-03}	1.75×10^{-01}	3.54×10^{-01}
PROPYLENE DICHLORIDE	1.50×10^{-04}	1.78×10^{-05}	6.17×10^{-06}	1.69×10^{-04}	3.43×10^{-04}
PROPYLENE GLYCOL	2.84×10^{-03}	3.39×10^{-04}	1.17×10^{-04}	3.22×10^{-03}	6.52×10^{-03}
PROPYLENE OXIDE	3.74×10^{-03}	4.46×10^{-04}	1.54×10^{-04}	4.23×10^{-03}	8.57×10^{-03}
PYRENE	9.84×10^{-04}	1.17×10^{-04}	4.06×10^{-05}	1.11×10^{-03}	2.26×10^{-03}
RETENE	3.26×10^{-04}	3.89×10^{-05}	1.35×10^{-05}	3.70×10^{-04}	7.49×10^{-04}
S-BUTYL ALCOHOL	2.54×10^{-03}	3.03×10^{-04}	1.05×10^{-04}	2.88×10^{-03}	5.83×10^{-03}
S-BUTYLBENZENE	9.11×10^{-03}	1.09×10^{-03}	3.76×10^{-04}	1.03×10^{-02}	2.09×10^{-02}
STYRENE	5.33×10^{-03}	6.35×10^{-04}	2.20×10^{-04}	6.03×10^{-03}	1.22×10^{-02}
SUBSTITUTED C9 ESTER (C12)	6.73×10^{-04}	8.02×10^{-05}	2.78×10^{-05}	7.62×10^{-04}	1.54×10^{-03}
SULFUR DIOXIDE	7.01×10^{-02}	8.36×10^{-03}	2.89×10^{-03}	7.94×10^{-02}	1.61×10^{-01}
T-3-HEXENE	1.07×10^{-02}	1.28×10^{-03}	4.42×10^{-04}	1.21×10^{-02}	2.46×10^{-02}
TERT-BUTYL ALCOHOL	3.14×10^{-03}	3.74×10^{-04}	1.30×10^{-04}	3.56×10^{-03}	7.20×10^{-03}
TETRACHLOROETHYLENE	5.23×10^{-03}	6.24×10^{-04}	2.16×10^{-04}	5.93×10^{-03}	1.20×10^{-02}
TETRAFLUOROMETHANE	2.24×10^{-04}	2.67×10^{-05}	9.26×10^{-06}	2.54×10^{-04}	5.14×10^{-04}
TOLUENE	5.04×10^{-01}	6.02×10^{-02}	2.08×10^{-02}	5.72×10^{-01}	1.16
TOLUENE DIISOCYANATE	4.93×10^{-03}	5.88×10^{-04}	2.04×10^{-04}	5.59×10^{-03}	1.13×10^{-02}
TOTAL AROMATIC AMINES	2.99×10^{-04}	3.57×10^{-05}	1.23×10^{-05}	3.39×10^{-04}	6.86×10^{-04}
TOTAL C2-C5 ALDEHYDES	8.97×10^{-04}	1.07×10^{-04}	3.70×10^{-05}	1.02×10^{-03}	2.06×10^{-03}
TOTAL SUSPENDED PARTICULATES	9.62×10^{-02}	1.15×10^{-02}	3.97×10^{-03}	1.09×10^{-01}	2.21×10^{-01}
TOTAL VOCS	7.02	8.37×10^{-01}	2.90×10^{-01}	7.96	$1.61 \times 10^{+01}$
TRANS-2-BUTENE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
TRANS-2-PENTENE	1.82×10^{-02}	2.17×10^{-03}	7.52×10^{-04}	2.06×10^{-02}	4.18×10^{-02}
TRICHLOROBENZENES	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}
TRICHLOROETHYLENE	3.21×10^{-03}	3.83×10^{-04}	1.33×10^{-04}	3.64×10^{-03}	7.37×10^{-03}
TRICHLOROFLUOROMETHANE	4.56×10^{-03}	5.44×10^{-04}	1.88×10^{-04}	5.17×10^{-03}	1.05×10^{-02}
TRICHLOROTRIFLUOROETHANE	2.99×10^{-03}	3.57×10^{-04}	1.23×10^{-04}	3.39×10^{-03}	6.86×10^{-03}
TRIFLUOROMETHANE	2.24×10^{-03}	2.67×10^{-04}	9.26×10^{-05}	2.54×10^{-03}	5.14×10^{-03}
TRIMETHYLBENZENE	8.22×10^{-04}	9.81×10^{-05}	3.39×10^{-05}	9.32×10^{-04}	1.89×10^{-03}
TRIMETHYLCYCLOHEXANES	1.50×10^{-04}	1.78×10^{-05}	6.17×10^{-06}	1.69×10^{-04}	3.43×10^{-04}
TRIMETHYLCYCLOPENTANE	7.48×10^{-05}	8.92×10^{-06}	3.09×10^{-06}	8.47×10^{-05}	1.71×10^{-04}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
TRIMETHYLDECENE	1.50×10^{-04}	1.78×10^{-05}	6.17×10^{-06}	1.69×10^{-04}	3.43×10^{-04}
TRIMETHYLFLUOROSILANE	5.16×10^{-03}	6.15×10^{-04}	2.13×10^{-04}	5.84×10^{-03}	1.18×10^{-02}
TRIMETHYLHEPTANES	1.50×10^{-04}	1.78×10^{-05}	6.17×10^{-06}	1.69×10^{-04}	3.43×10^{-04}
VINYL ACETATE	4.11×10^{-03}	4.90×10^{-04}	1.70×10^{-04}	4.66×10^{-03}	9.43×10^{-03}
VINYL CHLORIDE	3.14×10^{-03}	3.74×10^{-04}	1.30×10^{-04}	3.56×10^{-03}	7.20×10^{-03}
ZINC AND COMPOUNDS	4.66×10^{-04}	5.56×10^{-05}	1.92×10^{-05}	5.28×10^{-04}	1.07×10^{-03}

Table C1.9: Annual Emissions from Commercial Off-Road Vehicles and Equipment – Diesel

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
1,2,4-TRIMETHYLBENZENE	1.60×10^{-01}	1.91×10^{-02}	6.63×10^{-03}	1.82×10^{-01}	3.68×10^{-01}
1,3,5-TRIMETHYLBENZENE	4.74×10^{-02}	5.66×10^{-03}	1.96×10^{-03}	5.37×10^{-02}	1.09×10^{-01}
1,3-BUTADIENE	5.65×10^{-02}	6.74×10^{-03}	2.33×10^{-03}	6.41×10^{-02}	1.30×10^{-01}
1-METHYL-3-ETHYLBENZENE	3.83×10^{-02}	4.57×10^{-03}	1.58×10^{-03}	4.34×10^{-02}	8.78×10^{-02}
1-METHYL-4-ETHYLBENZENE	9.48×10^{-02}	1.13×10^{-02}	3.91×10^{-03}	1.07×10^{-01}	2.17×10^{-01}
1-METHYLNAPHTHALENE	6.89×10^{-02}	8.22×10^{-03}	2.85×10^{-03}	7.81×10^{-02}	1.58×10^{-01}
1-METHYLPHENANTHRENE	3.10×10^{-03}	3.70×10^{-04}	1.28×10^{-04}	3.51×10^{-03}	7.11×10^{-03}
2,2,4-TRIMETHYLPENTANE	2.26×10^{-01}	2.70×10^{-02}	9.34×10^{-03}	2.56×10^{-01}	5.19×10^{-01}
2,2-DIMETHYLBUTANE	5.65×10^{-02}	6.74×10^{-03}	2.33×10^{-03}	6.41×10^{-02}	1.30×10^{-01}
2,3,4-TRIMETHYLPENTANE	5.65×10^{-02}	6.74×10^{-03}	2.33×10^{-03}	6.41×10^{-02}	1.30×10^{-01}
2,3-DIMETHYLBUTANE	1.04×10^{-01}	1.24×10^{-02}	4.29×10^{-03}	1.18×10^{-01}	2.38×10^{-01}
2,3-DIMETHYLHEXANE	2.92×10^{-02}	3.48×10^{-03}	1.21×10^{-03}	3.31×10^{-02}	6.70×10^{-02}
2,3-DIMETHYLPENTANE	1.31×10^{-01}	1.57×10^{-02}	5.42×10^{-03}	1.49×10^{-01}	3.01×10^{-01}
2,4-DIMETHYLHEXANE	9.14×10^{-03}	1.09×10^{-03}	3.77×10^{-04}	1.04×10^{-02}	2.10×10^{-02}
2,4-DIMETHYLPENTANE	7.48×10^{-02}	8.92×10^{-03}	3.09×10^{-03}	8.47×10^{-02}	1.71×10^{-01}
2,5-DIMETHYLHEXANE	9.14×10^{-03}	1.09×10^{-03}	3.77×10^{-04}	1.04×10^{-02}	2.10×10^{-02}
2-METHYL-1-BUTENE	4.74×10^{-02}	5.66×10^{-03}	1.96×10^{-03}	5.37×10^{-02}	1.09×10^{-01}
2-METHYL-2-PENTENE	3.83×10^{-02}	4.57×10^{-03}	1.58×10^{-03}	4.34×10^{-02}	8.78×10^{-02}
2-METHYL-2-PROPENAL	7.30×10^{-01}	8.70×10^{-02}	3.01×10^{-02}	8.27×10^{-01}	1.67
2-METHYLANTHRACENE	1.89×10^{-03}	2.25×10^{-04}	7.79×10^{-05}	2.14×10^{-03}	4.33×10^{-03}
2-METHYLCHOLANTHRENE	1.31×10^{-02}	1.56×10^{-03}	5.41×10^{-04}	1.49×10^{-02}	3.01×10^{-02}
2-METHYLHEPTANE	1.82×10^{-02}	2.18×10^{-03}	7.53×10^{-04}	2.07×10^{-02}	4.18×10^{-02}
2-METHYLHEXANE	1.04×10^{-01}	1.24×10^{-02}	4.29×10^{-03}	1.18×10^{-01}	2.38×10^{-01}
2-METHYLNAPHTHALENE	1.11×10^{-01}	1.33×10^{-02}	4.60×10^{-03}	1.26×10^{-01}	2.56×10^{-01}
2-METHYLPENTANE	1.70×10^{-01}	2.02×10^{-02}	7.00×10^{-03}	1.92×10^{-01}	3.89×10^{-01}
3-ETHYLHEXANE	3.83×10^{-02}	4.57×10^{-03}	1.58×10^{-03}	4.34×10^{-02}	8.78×10^{-02}
3-METHYL-1-BUTENE	2.92×10^{-02}	3.48×10^{-03}	1.21×10^{-03}	3.31×10^{-02}	6.70×10^{-02}
3-METHYLHEXANE	5.65×10^{-02}	6.74×10^{-03}	2.33×10^{-03}	6.41×10^{-02}	1.30×10^{-01}
3-METHYLPENTANE	1.22×10^{-01}	1.46×10^{-02}	5.04×10^{-03}	1.38×10^{-01}	2.80×10^{-01}
3-METHYLPHENANTHRENE	5.53×10^{-03}	6.59×10^{-04}	2.28×10^{-04}	6.26×10^{-03}	1.27×10^{-02}
9-METHYLPHENANTHRENE	4.18×10^{-03}	4.99×10^{-04}	1.73×10^{-04}	4.74×10^{-03}	9.59×10^{-03}
ACENAPHTHENE	3.13×10^{-02}	3.73×10^{-03}	1.29×10^{-03}	3.55×10^{-02}	7.18×10^{-02}
ACENAPHTHYLENE	2.63×10^{-02}	3.13×10^{-03}	1.08×10^{-03}	2.98×10^{-02}	6.02×10^{-02}
ACETALDEHYDE	7.62	9.09×10^{-01}	3.15×10^{-01}	8.64	$1.75 \times 10^{+01}$
ACETOPHENONE	9.30×10^{-01}	1.11×10^{-01}	3.84×10^{-02}	1.05	2.13
ACETYLENE	8.39×10^{-01}	1.00×10^{-01}	3.46×10^{-02}	9.51×10^{-01}	1.92
ACROLEIN	6.20×10^{-01}	7.40×10^{-02}	2.56×10^{-02}	7.03×10^{-01}	1.42
ANTHRACENE	4.84×10^{-03}	5.78×10^{-04}	2.00×10^{-04}	5.49×10^{-03}	1.11×10^{-02}
BENZALDEHYDE	6.93×10^{-01}	8.27×10^{-02}	2.86×10^{-02}	7.85×10^{-01}	1.59
BENZENE	5.00×10^{-01}	5.96×10^{-02}	2.06×10^{-02}	5.66×10^{-01}	1.15
BENZO(A)ANTHRACENE	6.03×10^{-03}	7.19×10^{-04}	2.49×10^{-04}	6.83×10^{-03}	1.38×10^{-02}
BENZO(A)PYRENE	4.87×10^{-03}	5.81×10^{-04}	2.01×10^{-04}	5.52×10^{-03}	1.12×10^{-02}
BENZO(B)FLUORANTHENE	2.71×10^{-03}	3.23×10^{-04}	1.12×10^{-04}	3.07×10^{-03}	6.21×10^{-03}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
BENZO(E)PYRENE	2.88×10^{-03}	3.43×10^{-04}	1.19×10^{-04}	3.26×10^{-03}	6.60×10^{-03}
BENZO(G,H,I)FLUORANTHENE	1.04×10^{-03}	1.25×10^{-04}	4.31×10^{-05}	1.18×10^{-03}	2.40×10^{-03}
BENZO(G,H,I,)PERYLENE	2.03×10^{-03}	2.42×10^{-04}	8.36×10^{-05}	2.30×10^{-03}	4.65×10^{-03}
BENZO(K)FLUORANTHENE	2.61×10^{-03}	3.11×10^{-04}	1.08×10^{-04}	2.96×10^{-03}	5.98×10^{-03}
BUTYRALDEHYDE	2.37×10^{-01}	2.83×10^{-02}	9.79×10^{-03}	2.69×10^{-01}	5.44×10^{-01}
CADMIUM AND COMPOUNDS	2.17×10^{-02}	2.59×10^{-03}	8.96×10^{-04}	2.46×10^{-02}	4.98×10^{-02}
CARBON MONOXIDE	$1.24 \times 10^{+02}$	$1.48 \times 10^{+01}$	5.12	$1.41 \times 10^{+02}$	$2.85 \times 10^{+02}$
CHROMIUM (III) COMPOUNDS	2.53×10^{-03}	3.02×10^{-04}	1.04×10^{-04}	2.87×10^{-03}	5.81×10^{-03}
CHROMIUM (VI) COMPOUNDS	1.08×10^{-03}	1.29×10^{-04}	4.48×10^{-05}	1.23×10^{-03}	2.49×10^{-03}
CHRYSENE	3.27×10^{-03}	3.90×10^{-04}	1.35×10^{-04}	3.70×10^{-03}	7.50×10^{-03}
CIS-2-BUTENE	4.74×10^{-02}	5.66×10^{-03}	1.96×10^{-03}	5.37×10^{-02}	1.09×10^{-01}
CIS-2-HEXENE	1.82×10^{-02}	2.18×10^{-03}	7.53×10^{-04}	2.07×10^{-02}	4.18×10^{-02}
COBALT AND COMPOUNDS	3.62×10^{-03}	4.31×10^{-04}	1.49×10^{-04}	4.10×10^{-03}	8.29×10^{-03}
COPPER AND COMPOUNDS	3.62×10^{-03}	4.31×10^{-04}	1.49×10^{-04}	4.10×10^{-03}	8.29×10^{-03}
CORONENE	1.35×10^{-04}	1.61×10^{-05}	5.57×10^{-06}	1.53×10^{-04}	3.10×10^{-04}
CROTONALDEHYDE	2.44	2.91×10^{-01}	1.01×10^{-01}	2.77	5.61
CYCLOHEXANE	3.83×10^{-02}	4.57×10^{-03}	1.58×10^{-03}	4.34×10^{-02}	8.78×10^{-02}
CYCLOPENTA(C,D)PYRENE	4.46×10^{-03}	5.31×10^{-04}	1.84×10^{-04}	5.05×10^{-03}	1.02×10^{-02}
CYCLOPENTANE	7.48×10^{-02}	8.92×10^{-03}	3.09×10^{-03}	8.47×10^{-02}	1.71×10^{-01}
CYCLOPENTENE	3.83×10^{-02}	4.57×10^{-03}	1.58×10^{-03}	4.34×10^{-02}	8.78×10^{-02}
DECANOIC ACID	1.33×10^{-02}	1.58×10^{-03}	5.48×10^{-04}	1.50×10^{-02}	3.05×10^{-02}
DECYLCYCLOHEXANE	6.98×10^{-03}	8.32×10^{-04}	2.88×10^{-04}	7.91×10^{-03}	1.60×10^{-02}
DIACETYL	1.64×10^{-01}	1.96×10^{-02}	6.78×10^{-03}	1.86×10^{-01}	3.77×10^{-01}
DIBENZO(A,H)ANTHRACENE	2.62×10^{-03}	3.13×10^{-04}	1.08×10^{-04}	2.97×10^{-03}	6.02×10^{-03}
DIBENZOFURAN	5.22×10^{-03}	6.23×10^{-04}	2.16×10^{-04}	5.92×10^{-03}	1.20×10^{-02}
EICOSANE	3.76×10^{-02}	4.48×10^{-03}	1.55×10^{-03}	4.26×10^{-02}	8.62×10^{-02}
ETHYLBENZENE	8.57×10^{-02}	1.02×10^{-02}	3.54×10^{-03}	9.71×10^{-02}	1.97×10^{-01}
ETHYLENE	1.56	1.86×10^{-01}	6.45×10^{-02}	1.77	3.58
FLUORANTHENE	2.41×10^{-03}	2.88×10^{-04}	9.97×10^{-05}	2.74×10^{-03}	5.54×10^{-03}
FLUORENE	2.00×10^{-02}	2.38×10^{-03}	8.24×10^{-04}	2.26×10^{-02}	4.58×10^{-02}
FORMALDEHYDE	4.07	4.85×10^{-01}	1.68×10^{-01}	4.61	9.33
GLYOXAL	3.83×10^{-01}	4.57×10^{-02}	1.58×10^{-02}	4.34×10^{-01}	8.78×10^{-01}
HEPTADECANE	1.12×10^{-01}	1.34×10^{-02}	4.62×10^{-03}	1.27×10^{-01}	2.57×10^{-01}
HEPTANAL	5.84×10^{-01}	6.96×10^{-02}	2.41×10^{-02}	6.61×10^{-01}	1.34
HEPTYLCYCLOHEXANE	3.64×10^{-03}	4.34×10^{-04}	1.50×10^{-04}	4.12×10^{-03}	8.35×10^{-03}
HEXADECANE	1.30×10^{-01}	1.55×10^{-02}	5.35×10^{-03}	1.47×10^{-01}	2.97×10^{-01}
HEXALDEHYDE	4.01×10^{-01}	4.79×10^{-02}	1.66×10^{-02}	4.55×10^{-01}	9.20×10^{-01}
HEXYLCYCLOHEXANE	2.73×10^{-03}	3.26×10^{-04}	1.13×10^{-04}	3.09×10^{-03}	6.26×10^{-03}
INDENO(1,2,3-C,D)PYRENE	3.78×10^{-03}	4.51×10^{-04}	1.56×10^{-04}	4.29×10^{-03}	8.68×10^{-03}
ISOBUTYLENE	2.08×10^{-01}	2.48×10^{-02}	8.58×10^{-03}	2.36×10^{-01}	4.77×10^{-01}
ISOMERS OF XYLENE	5.76×10^{-01}	6.87×10^{-02}	2.38×10^{-02}	6.53×10^{-01}	1.32
ISOPENTANE	5.00×10^{-01}	5.96×10^{-02}	2.06×10^{-02}	5.66×10^{-01}	1.15
LAURIC ACID	1.07×10^{-02}	1.27×10^{-03}	4.41×10^{-04}	1.21×10^{-02}	2.45×10^{-02}
LEAD AND COMPOUNDS	3.62×10^{-03}	4.31×10^{-04}	1.49×10^{-04}	4.10×10^{-03}	8.29×10^{-03}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
MANGANESE AND COMPOUNDS	3.62×10^{-03}	4.31×10^{-04}	1.49×10^{-04}	4.10×10^{-03}	8.29×10^{-03}
METHYL ETHYL KETONE	1.37	1.63×10^{-01}	5.65×10^{-02}	1.55	3.14
METHYLCYCLOHEXANE	9.48×10^{-02}	1.13×10^{-02}	3.91×10^{-03}	1.07×10^{-01}	2.17×10^{-01}
METHYLCYCLOPENTANE	1.13×10^{-01}	1.35×10^{-02}	4.67×10^{-03}	1.28×10^{-01}	2.59×10^{-01}
METHYLGLYOXAL	3.10×10^{-01}	3.70×10^{-02}	1.28×10^{-02}	3.51×10^{-01}	7.11×10^{-01}
MYRISTIC ACID	9.78×10^{-04}	1.17×10^{-04}	4.04×10^{-05}	1.11×10^{-03}	2.24×10^{-03}
NAPHTHALENE	1.47×10^{-01}	1.75×10^{-02}	6.07×10^{-03}	1.66×10^{-01}	3.37×10^{-01}
N-BUTANE	6.99×10^{-01}	8.33×10^{-02}	2.88×10^{-02}	7.91×10^{-01}	1.60
N-DODECANE	9.18×10^{-02}	1.09×10^{-02}	3.79×10^{-03}	1.04×10^{-01}	2.10×10^{-01}
N-HENEICOSANE	1.20×10^{-02}	1.43×10^{-03}	4.95×10^{-04}	1.36×10^{-02}	2.75×10^{-02}
N-HEPTANE	8.57×10^{-02}	1.02×10^{-02}	3.54×10^{-03}	9.71×10^{-02}	1.97×10^{-01}
NITRIC OXIDE	$2.22 \times 10^{+02}$	$2.65 \times 10^{+01}$	9.16	$2.51 \times 10^{+02}$	$5.09 \times 10^{+02}$
NITROGEN DIOXIDE	$1.79 \times 10^{+01}$	2.13	7.39×10^{-01}	$2.03 \times 10^{+01}$	$4.11 \times 10^{+01}$
N-NONANE	2.92×10^{-02}	3.48×10^{-03}	1.21×10^{-03}	3.31×10^{-02}	6.70×10^{-02}
N-NONYLCYCLOHEXANE	4.52×10^{-03}	5.39×10^{-04}	1.86×10^{-04}	5.12×10^{-03}	1.04×10^{-02}
N-OCTANE	4.74×10^{-02}	5.66×10^{-03}	1.96×10^{-03}	5.37×10^{-02}	1.09×10^{-01}
NONADECANE	7.50×10^{-02}	8.94×10^{-03}	3.10×10^{-03}	8.49×10^{-02}	1.72×10^{-01}
NONANOIC ACID	4.38×10^{-02}	5.22×10^{-03}	1.81×10^{-03}	4.96×10^{-02}	1.00×10^{-01}
N-PENTANE	3.39×10^{-01}	4.05×10^{-02}	1.40×10^{-02}	3.84×10^{-01}	7.78×10^{-01}
N-PROPYLBENZENE	1.82×10^{-02}	2.18×10^{-03}	7.53×10^{-04}	2.07×10^{-02}	4.18×10^{-02}
N-TRIDECANE	8.70×10^{-02}	1.04×10^{-02}	3.59×10^{-03}	9.86×10^{-02}	2.00×10^{-01}
OCTADECANE	1.10×10^{-01}	1.31×10^{-02}	4.53×10^{-03}	1.24×10^{-01}	2.51×10^{-01}
OCTANAL	5.65×10^{-01}	6.74×10^{-02}	2.33×10^{-02}	6.41×10^{-01}	1.30
OCTANOIC ACID	2.28×10^{-02}	2.72×10^{-03}	9.41×10^{-04}	2.58×10^{-02}	5.23×10^{-02}
OCTYLCYCLOHEXANE	4.79×10^{-03}	5.71×10^{-04}	1.98×10^{-04}	5.42×10^{-03}	1.10×10^{-02}
OXIDES OF NITROGEN	$3.58 \times 10^{+02}$	$4.27 \times 10^{+01}$	$1.48 \times 10^{+01}$	$4.06 \times 10^{+02}$	$8.21 \times 10^{+02}$
PARTICULATE MATTER < 10 µm	$3.62 \times 10^{+01}$	4.31	1.49	$4.10 \times 10^{+01}$	$8.29 \times 10^{+01}$
PARTICULATE MATTER < 2.5 µm	$3.51 \times 10^{+01}$	4.18	1.45	$3.97 \times 10^{+01}$	$8.04 \times 10^{+01}$
PENTADECANE	7.26×10^{-02}	8.66×10^{-03}	3.00×10^{-03}	8.22×10^{-02}	1.66×10^{-01}
PENTYLCYCLOHEXANE	1.53×10^{-02}	1.83×10^{-03}	6.32×10^{-04}	1.73×10^{-02}	3.51×10^{-02}
PHENANTHRENE	1.80×10^{-02}	2.15×10^{-03}	7.44×10^{-04}	2.04×10^{-02}	4.13×10^{-02}
POLYCHLORINATED DIOXINS AND FURANS	9.20×10^{-08}	1.10×10^{-08}	3.80×10^{-09}	1.04×10^{-07}	2.11×10^{-07}
POLYCYCLIC AROMATIC HYDROCARBONS	2.88×10^{-01}	3.43×10^{-02}	1.19×10^{-02}	3.26×10^{-01}	6.60×10^{-01}
PROPIONALDEHYDE	2.55	3.05×10^{-01}	1.05×10^{-01}	2.89	5.86
PROPYLENE	1.42×10^{-01}	1.70×10^{-02}	5.87×10^{-03}	1.61×10^{-01}	3.26×10^{-01}
PYRENE	1.29×10^{-03}	1.53×10^{-04}	5.31×10^{-05}	1.46×10^{-03}	2.95×10^{-03}
RETENE	1.41×10^{-03}	1.68×10^{-04}	5.81×10^{-05}	1.59×10^{-03}	3.23×10^{-03}
SULFUR DIOXIDE	$1.33 \times 10^{+01}$	1.59	5.50×10^{-01}	$1.51 \times 10^{+01}$	$3.06 \times 10^{+01}$
TETRADECANE	1.15×10^{-01}	1.37×10^{-02}	4.74×10^{-03}	1.30×10^{-01}	2.63×10^{-01}
TOLUENE	7.26×10^{-01}	8.66×10^{-02}	3.00×10^{-02}	8.22×10^{-01}	1.66
TOTAL SUSPENDED PARTICULATES	$3.81 \times 10^{+01}$	4.54	1.57	$4.31 \times 10^{+01}$	$8.73 \times 10^{+01}$
TOTAL VOCS	$3.38 \times 10^{+01}$	4.03	1.39	$3.82 \times 10^{+01}$	$7.74 \times 10^{+01}$
TRANS-2-BUTENE	9.48×10^{-02}	1.13×10^{-02}	3.91×10^{-03}	1.07×10^{-01}	2.17×10^{-01}
TRANS-2-HEXENE	2.92×10^{-02}	3.48×10^{-03}	1.21×10^{-03}	3.31×10^{-02}	6.70×10^{-02}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
TRANS-2-PENTENE	9.14×10^{-03}	1.09×10^{-03}	3.77×10^{-04}	1.04×10^{-02}	2.10×10^{-02}
TRIDECANOIC ACID	2.39×10^{-03}	2.85×10^{-04}	9.88×10^{-05}	2.71×10^{-03}	5.49×10^{-03}
UNDECANOIC ACID	3.76×10^{-02}	4.48×10^{-03}	1.55×10^{-03}	4.26×10^{-02}	8.62×10^{-02}
ZINC AND COMPOUNDS	2.53×10^{-02}	3.02×10^{-03}	1.04×10^{-03}	2.87×10^{-02}	5.81×10^{-02}

Table C1.10: Annual Emissions from Commercial Off-Road Vehicles and Equipment – LPG

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
1,2,3-TRIMETHYLBENZENE	1.12×10^{-02}	1.34×10^{-03}	4.62×10^{-04}	1.27×10^{-02}	2.57×10^{-02}
1,2,4-TRIMETHYLBENZENE	1.12×10^{-02}	1.34×10^{-03}	4.62×10^{-04}	1.27×10^{-02}	2.57×10^{-02}
1,3,5-TRIMETHYLBENZENE	2.24×10^{-02}	2.67×10^{-03}	9.25×10^{-04}	2.54×10^{-02}	5.14×10^{-02}
1,3-BUTADIENE	1.39×10^{-03}	1.65×10^{-04}	5.72×10^{-05}	1.57×10^{-03}	3.18×10^{-03}
1-NONENE	1.12×10^{-02}	1.34×10^{-03}	4.62×10^{-04}	1.27×10^{-02}	2.57×10^{-02}
1-PENTENE	1.12×10^{-02}	1.34×10^{-03}	4.62×10^{-04}	1.27×10^{-02}	2.57×10^{-02}
2,2-DIMETHYLBUTANE	1.12×10^{-02}	1.34×10^{-03}	4.62×10^{-04}	1.27×10^{-02}	2.57×10^{-02}
2,4-DIMETHYLPENTANE	1.12×10^{-02}	1.34×10^{-03}	4.62×10^{-04}	1.27×10^{-02}	2.57×10^{-02}
2-METHYL-1-PENTENE	2.24×10^{-02}	2.67×10^{-03}	9.25×10^{-04}	2.54×10^{-02}	5.14×10^{-02}
2-METHYL-2-BUTENE	1.12×10^{-02}	1.34×10^{-03}	4.62×10^{-04}	1.27×10^{-02}	2.57×10^{-02}
3-METHYLHEPTANE	2.24×10^{-02}	2.67×10^{-03}	9.25×10^{-04}	2.54×10^{-02}	5.14×10^{-02}
3-METHYLHEXANE	1.12×10^{-02}	1.34×10^{-03}	4.62×10^{-04}	1.27×10^{-02}	2.57×10^{-02}
3-METHYLPENTANE	2.24×10^{-02}	2.67×10^{-03}	9.25×10^{-04}	2.54×10^{-02}	5.14×10^{-02}
ACETALDEHYDE	1.54×10^{-02}	1.84×10^{-03}	6.37×10^{-04}	1.75×10^{-02}	3.54×10^{-02}
ACETYLENE	3.58×10^{-01}	4.27×10^{-02}	1.48×10^{-02}	4.06×10^{-01}	8.22×10^{-01}
BENZENE	2.37×10^{-04}	2.82×10^{-05}	9.77×10^{-06}	2.68×10^{-04}	5.43×10^{-04}
C10 AROMATIC	1.12×10^{-02}	1.34×10^{-03}	4.62×10^{-04}	1.27×10^{-02}	2.57×10^{-02}
C10 OLEFINS	2.24×10^{-02}	2.67×10^{-03}	9.25×10^{-04}	2.54×10^{-02}	5.14×10^{-02}
C3/C4/C5 ALKYLBENZENES	1.12×10^{-02}	1.34×10^{-03}	4.62×10^{-04}	1.27×10^{-02}	2.57×10^{-02}
C9 OLEFINS	4.48×10^{-02}	5.34×10^{-03}	1.85×10^{-03}	5.07×10^{-02}	1.03×10^{-01}
CARBON MONOXIDE	$3.00 \times 10^{+02}$	$3.58 \times 10^{+01}$	$1.24 \times 10^{+01}$	$3.40 \times 10^{+02}$	$6.89 \times 10^{+02}$
CHROMIUM (III) COMPOUNDS	4.21×10^{-03}	5.02×10^{-04}	1.74×10^{-04}	4.77×10^{-03}	9.66×10^{-03}
CHROMIUM (VI) COMPOUNDS	4.21×10^{-03}	5.02×10^{-04}	1.74×10^{-04}	4.77×10^{-03}	9.66×10^{-03}
CIS-2-BUTENE	2.24×10^{-02}	2.67×10^{-03}	9.25×10^{-04}	2.54×10^{-02}	5.14×10^{-02}
COBALT AND COMPOUNDS	1.53×10^{-02}	1.83×10^{-03}	6.32×10^{-04}	1.74×10^{-02}	3.51×10^{-02}
COPPER AND COMPOUNDS	3.83×10^{-04}	4.57×10^{-05}	1.58×10^{-05}	4.34×10^{-04}	8.78×10^{-04}
CYCLOHEXANE	1.12×10^{-02}	1.34×10^{-03}	4.62×10^{-04}	1.27×10^{-02}	2.57×10^{-02}
CYCLOPENTANE	2.24×10^{-02}	2.67×10^{-03}	9.25×10^{-04}	2.54×10^{-02}	5.14×10^{-02}
ETHANE	$1.57 \times 10^{+01}$	1.87	6.47×10^{-01}	$1.78 \times 10^{+01}$	$3.60 \times 10^{+01}$
ETHYLBENZENE	1.12×10^{-02}	1.34×10^{-03}	4.62×10^{-04}	1.27×10^{-02}	2.57×10^{-02}
ETHYLENE	7.05×10^{-01}	8.41×10^{-02}	2.91×10^{-02}	7.99×10^{-01}	1.62
FORMALDEHYDE	4.47×10^{-02}	5.33×10^{-03}	1.84×10^{-03}	5.06×10^{-02}	1.02×10^{-01}
HEPTENE	1.12×10^{-02}	1.34×10^{-03}	4.62×10^{-04}	1.27×10^{-02}	2.57×10^{-02}
ISOBUTANE	4.81×10^{-01}	5.74×10^{-02}	1.99×10^{-02}	5.46×10^{-01}	1.10
ISOBUTYLENE	2.24×10^{-02}	2.67×10^{-03}	9.25×10^{-04}	2.54×10^{-02}	5.14×10^{-02}
ISOBUTYRALDEHYDE	2.24×10^{-02}	2.67×10^{-03}	9.25×10^{-04}	2.54×10^{-02}	5.14×10^{-02}
ISOMERS OF BUTENE	2.91×10^{-01}	3.47×10^{-02}	1.20×10^{-02}	3.30×10^{-01}	6.68×10^{-01}
ISOMERS OF DECANE	2.24×10^{-02}	2.67×10^{-03}	9.25×10^{-04}	2.54×10^{-02}	5.14×10^{-02}
ISOMERS OF HEPTANE	4.48×10^{-02}	5.34×10^{-03}	1.85×10^{-03}	5.07×10^{-02}	1.03×10^{-01}
ISOMERS OF HEXANE	2.24×10^{-02}	2.67×10^{-03}	9.25×10^{-04}	2.54×10^{-02}	5.14×10^{-02}
ISOMERS OF NONANE	1.12×10^{-02}	1.34×10^{-03}	4.62×10^{-04}	1.27×10^{-02}	2.57×10^{-02}
ISOMERS OF OCTANE	2.24×10^{-02}	2.67×10^{-03}	9.25×10^{-04}	2.54×10^{-02}	5.14×10^{-02}
ISOMERS OF PENTANE	1.46×10^{-01}	1.74×10^{-02}	6.01×10^{-03}	1.65×10^{-01}	3.34×10^{-01}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
ISOMERS OF XYLENE	4.48×10^{-02}	5.34×10^{-03}	1.85×10^{-03}	5.07×10^{-02}	1.03×10^{-01}
LEAD AND COMPOUNDS	3.83×10^{-04}	4.57×10^{-05}	1.58×10^{-05}	4.34×10^{-04}	8.78×10^{-04}
MANGANESE AND COMPOUNDS	3.83×10^{-04}	4.57×10^{-05}	1.58×10^{-05}	4.34×10^{-04}	8.78×10^{-04}
METHANE	$8.59 \times 10^{+01}$	$1.02 \times 10^{+01}$	3.55	$9.73 \times 10^{+01}$	$1.97 \times 10^{+02}$
METHYLCYCLOHEXANE	2.24×10^{-02}	2.67×10^{-03}	9.25×10^{-04}	2.54×10^{-02}	5.14×10^{-02}
METHYLCYCLOPENTANE	4.48×10^{-02}	5.34×10^{-03}	1.85×10^{-03}	5.07×10^{-02}	1.03×10^{-01}
M-ETHYLTOLUENE	1.12×10^{-02}	1.34×10^{-03}	4.62×10^{-04}	1.27×10^{-02}	2.57×10^{-02}
N-BUTANE	1.12	1.34×10^{-01}	4.62×10^{-02}	1.27	2.57
N-DECANE	1.12×10^{-02}	1.34×10^{-03}	4.62×10^{-04}	1.27×10^{-02}	2.57×10^{-02}
N-HEPTANE	2.24×10^{-02}	2.67×10^{-03}	9.25×10^{-04}	2.54×10^{-02}	5.14×10^{-02}
N-HEXANE	2.24×10^{-02}	2.67×10^{-03}	9.25×10^{-04}	2.54×10^{-02}	5.14×10^{-02}
NICKEL AND COMPOUNDS	4.21×10^{-03}	5.02×10^{-04}	1.74×10^{-04}	4.77×10^{-03}	9.66×10^{-03}
NITRIC OXIDE	$4.62 \times 10^{+01}$	5.51	1.91	$5.23 \times 10^{+01}$	$1.06 \times 10^{+02}$
NITROGEN DIOXIDE	3.73	4.45×10^{-01}	1.54×10^{-01}	4.22	8.55
N-NONANE	1.12×10^{-02}	1.34×10^{-03}	4.62×10^{-04}	1.27×10^{-02}	2.57×10^{-02}
N-OCTANE	2.24×10^{-02}	2.67×10^{-03}	9.25×10^{-04}	2.54×10^{-02}	5.14×10^{-02}
N-PENTANE	1.46×10^{-01}	1.74×10^{-02}	6.01×10^{-03}	1.65×10^{-01}	3.34×10^{-01}
N-UNDECANE	1.12×10^{-02}	1.34×10^{-03}	4.62×10^{-04}	1.27×10^{-02}	2.57×10^{-02}
OCTENE	1.12×10^{-02}	1.34×10^{-03}	4.62×10^{-04}	1.27×10^{-02}	2.57×10^{-02}
O-ETHYLTOLUENE	1.12×10^{-02}	1.34×10^{-03}	4.62×10^{-04}	1.27×10^{-02}	2.57×10^{-02}
OXIDES OF NITROGEN	$7.45 \times 10^{+01}$	8.89	3.08	$8.45 \times 10^{+01}$	$1.71 \times 10^{+02}$
PARTICULATE MATTER < 10 µm	7.66×10^{-01}	9.13×10^{-02}	3.16×10^{-02}	8.68×10^{-01}	1.76
PARTICULATE MATTER < 2.5 µm	7.66×10^{-01}	9.13×10^{-02}	3.16×10^{-02}	8.68×10^{-01}	1.76
PROPANE	3.26	3.89×10^{-01}	1.35×10^{-01}	3.69	7.47
PROPYLENE	1.89	2.26×10^{-01}	7.81×10^{-02}	2.14	4.34
SULFUR DIOXIDE	3.89×10^{-01}	4.63×10^{-02}	1.60×10^{-02}	4.40×10^{-01}	8.91×10^{-01}
TOLUENE	4.48×10^{-02}	5.34×10^{-03}	1.85×10^{-03}	5.07×10^{-02}	1.03×10^{-01}
TOTAL SUSPENDED PARTICULATES	8.06×10^{-01}	9.61×10^{-02}	3.33×10^{-02}	9.13×10^{-01}	1.85
TOTAL VOCS	$2.51 \times 10^{+01}$	2.99	1.04	$2.84 \times 10^{+01}$	$5.76 \times 10^{+01}$
TRANS-2-BUTENE	1.46×10^{-01}	1.74×10^{-02}	6.01×10^{-03}	1.65×10^{-01}	3.34×10^{-01}
TRANS-2-PENTENE	1.12×10^{-02}	1.34×10^{-03}	4.62×10^{-04}	1.27×10^{-02}	2.57×10^{-02}
ZINC AND COMPOUNDS	4.21×10^{-03}	5.02×10^{-04}	1.74×10^{-04}	4.77×10^{-03}	9.66×10^{-03}

Table C1.11: Annual Emissions from Commercial Off-Road Vehicles and Equipment – Wheel Generated Dust

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
ANTIMONY AND COMPOUNDS	1.73×10^{-02}	2.06×10^{-03}	7.15×10^{-04}	1.96×10^{-02}	3.97×10^{-02}
ARSENIC AND COMPOUNDS	2.96×10^{-02}	3.53×10^{-03}	1.22×10^{-03}	3.35×10^{-02}	6.78×10^{-02}
CADMIUM AND COMPOUNDS	4.61×10^{-02}	5.49×10^{-03}	1.90×10^{-03}	5.22×10^{-02}	1.06×10^{-01}
COBALT AND COMPOUNDS	2.99×10^{-01}	3.56×10^{-02}	1.23×10^{-02}	3.38×10^{-01}	6.85×10^{-01}
COPPER AND COMPOUNDS	1.92×10^{-01}	2.29×10^{-02}	7.93×10^{-03}	2.18×10^{-01}	4.41×10^{-01}
LEAD AND COMPOUNDS	1.83	2.19×10^{-01}	7.57×10^{-02}	2.08	4.21
MANGANESE AND COMPOUNDS	2.03	2.42×10^{-01}	8.39×10^{-02}	2.30	4.66
MERCURY AND COMPOUNDS	3.17×10^{-02}	3.78×10^{-03}	1.31×10^{-03}	3.59×10^{-02}	7.27×10^{-02}
NICKEL AND COMPOUNDS	1.37×10^{-01}	1.64×10^{-02}	5.66×10^{-03}	1.55×10^{-01}	3.15×10^{-01}
PARTICULATE MATTER < 10 µm	$4.68 \times 10^{+02}$	$5.58 \times 10^{+01}$	$1.93 \times 10^{+01}$	$5.30 \times 10^{+02}$	$1.07 \times 10^{+03}$
PARTICULATE MATTER < 2.5 µm	$1.94 \times 10^{+02}$	$2.32 \times 10^{+01}$	8.03	$2.20 \times 10^{+02}$	$4.46 \times 10^{+02}$
SELENIUM AND COMPOUNDS	2.20×10^{-03}	2.62×10^{-04}	9.08×10^{-05}	2.49×10^{-03}	5.04×10^{-03}
TOTAL SUSPENDED PARTICULATES	$2.11 \times 10^{+03}$	$2.51 \times 10^{+02}$	$8.69 \times 10^{+01}$	$2.39 \times 10^{+03}$	$4.83 \times 10^{+03}$
ZINC AND COMPOUNDS	1.30	1.56×10^{-01}	5.39×10^{-02}	1.48	2.99

Table C1.12: Annual Emissions from Commercial Ships – Main Engine

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
1,3-BUTADIENE	1.35	2.02	3.63×10^{-01}	1.45	5.19
1-BUTENE	2.58	3.87	6.95×10^{-01}	2.78	9.93
2,2,4-TRIMETHYLPENTANE	8.52×10^{-03}	1.28×10^{-02}	2.29×10^{-03}	9.18×10^{-03}	3.28×10^{-02}
ACENAPHTHENE	1.80×10^{-02}	2.70×10^{-02}	4.84×10^{-03}	1.94×10^{-02}	6.91×10^{-02}
ACENAPHTHYLENE	1.54×10^{-02}	2.32×10^{-02}	4.16×10^{-03}	1.66×10^{-02}	5.94×10^{-02}
ACETALDEHYDE	1.58	2.37	4.26×10^{-01}	1.70	6.09
ACETYLENE	2.18	3.27	5.86×10^{-01}	2.34	8.37
ACROLEIN	7.46×10^{-02}	1.12×10^{-01}	2.01×10^{-02}	8.03×10^{-02}	2.87×10^{-01}
ANTHRACENE	3.83×10^{-03}	5.75×10^{-03}	1.03×10^{-03}	4.13×10^{-03}	1.47×10^{-02}
ANTIMONY AND COMPOUNDS	6.95×10^{-04}	1.04×10^{-03}	1.87×10^{-04}	7.48×10^{-04}	2.67×10^{-03}
ARSENIC AND COMPOUNDS	1.96×10^{-03}	2.93×10^{-03}	5.26×10^{-04}	2.11×10^{-03}	7.52×10^{-03}
BENZENE	4.33×10^{-01}	6.50×10^{-01}	1.17×10^{-01}	4.67×10^{-01}	1.67
BENZO(A)ANTHRACENE	4.49×10^{-03}	6.74×10^{-03}	1.21×10^{-03}	4.84×10^{-03}	1.73×10^{-02}
BENZO(A)PYRENE	3.34×10^{-03}	5.01×10^{-03}	9.00×10^{-04}	3.60×10^{-03}	1.29×10^{-02}
BENZO(B)FLUORANTHENE	1.93×10^{-03}	2.90×10^{-03}	5.20×10^{-04}	2.08×10^{-03}	7.43×10^{-03}
BENZO(E)PYRENE	1.81×10^{-03}	2.72×10^{-03}	4.89×10^{-04}	1.95×10^{-03}	6.98×10^{-03}
BENZO(G,H,I)PERYLENE	1.46×10^{-03}	2.20×10^{-03}	3.94×10^{-04}	1.58×10^{-03}	5.63×10^{-03}
BENZO(K)FLUORANTHENE	1.87×10^{-03}	2.81×10^{-03}	5.04×10^{-04}	2.02×10^{-03}	7.20×10^{-03}
BERYLLIUM AND COMPOUNDS	1.40×10^{-03}	2.10×10^{-03}	3.77×10^{-04}	1.51×10^{-03}	5.38×10^{-03}
CADMIUM AND COMPOUNDS	4.96×10^{-05}	7.43×10^{-05}	1.33×10^{-05}	5.34×10^{-05}	1.91×10^{-04}
CARBON MONOXIDE	$1.14 \times 10^{+02}$	$1.71 \times 10^{+02}$	$3.07 \times 10^{+01}$	$1.23 \times 10^{+02}$	$4.39 \times 10^{+02}$
CHROMIUM (III) COMPOUNDS	5.23×10^{-05}	7.85×10^{-05}	1.41×10^{-05}	5.63×10^{-05}	2.01×10^{-04}
CHROMIUM (VI) COMPOUNDS	2.17×10^{-05}	3.25×10^{-05}	5.84×10^{-06}	2.34×10^{-05}	8.34×10^{-05}
CHRYSENE	2.17×10^{-03}	3.25×10^{-03}	5.84×10^{-04}	2.33×10^{-03}	8.34×10^{-03}
COBALT AND COMPOUNDS	1.27×10^{-03}	1.90×10^{-03}	3.42×10^{-04}	1.37×10^{-03}	4.88×10^{-03}
COPPER AND COMPOUNDS	1.20×10^{-03}	1.80×10^{-03}	3.24×10^{-04}	1.29×10^{-03}	4.62×10^{-03}
CORONENE	8.52×10^{-05}	1.28×10^{-04}	2.29×10^{-05}	9.18×10^{-05}	3.28×10^{-04}
CYCLOPENTA(C,D)PYRENE	2.81×10^{-03}	4.22×10^{-03}	7.57×10^{-04}	3.03×10^{-03}	1.08×10^{-02}
DIBENZO(A,H)ANTHRACENE	1.66×10^{-03}	2.48×10^{-03}	4.46×10^{-04}	1.78×10^{-03}	6.37×10^{-03}
ETHANE	5.40×10^{-01}	8.09×10^{-01}	1.45×10^{-01}	5.81×10^{-01}	2.08
ETHYLBENZENE	4.26×10^{-02}	6.39×10^{-02}	1.15×10^{-02}	4.59×10^{-02}	1.64×10^{-01}
ETHYLENE	5.53	8.29	1.49	5.96	$2.13 \times 10^{+01}$
FLUORANTHENE	1.60×10^{-03}	2.40×10^{-03}	4.31×10^{-04}	1.73×10^{-03}	6.16×10^{-03}
FLUORENE	1.13×10^{-02}	1.70×10^{-02}	3.06×10^{-03}	1.22×10^{-02}	4.37×10^{-02}
FORMALDEHYDE	3.19	4.78	8.58×10^{-01}	3.43	$1.23 \times 10^{+01}$
INDENO(1,2,3-C,D)PYRENE	2.41×10^{-03}	3.61×10^{-03}	6.48×10^{-04}	2.59×10^{-03}	9.26×10^{-03}
ISOMERS OF XYLENE	1.02×10^{-01}	1.53×10^{-01}	2.75×10^{-02}	1.10×10^{-01}	3.93×10^{-01}
LEAD AND COMPOUNDS	4.21×10^{-04}	6.31×10^{-04}	1.13×10^{-04}	4.53×10^{-04}	1.62×10^{-03}
MANGANESE AND COMPOUNDS	4.62×10^{-05}	6.93×10^{-05}	1.24×10^{-05}	4.97×10^{-05}	1.78×10^{-04}
MERCURY AND COMPOUNDS	4.53×10^{-05}	6.79×10^{-05}	1.22×10^{-05}	4.87×10^{-05}	1.74×10^{-04}
METHANE	2.24	3.35	6.02×10^{-01}	2.41	8.60
NAPHTHALENE	1.12×10^{-01}	1.68×10^{-01}	3.01×10^{-02}	1.21×10^{-01}	4.31×10^{-01}
N-HEXANE	1.17×10^{-01}	1.76×10^{-01}	3.15×10^{-02}	1.26×10^{-01}	4.51×10^{-01}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
NICKEL AND COMPOUNDS	1.48×10^{-04}	2.22×10^{-04}	3.99×10^{-05}	1.60×10^{-04}	5.70×10^{-04}
NITRIC OXIDE	$8.10 \times 10^{+02}$	$1.21 \times 10^{+03}$	$2.18 \times 10^{+02}$	$8.72 \times 10^{+02}$	$3.12 \times 10^{+03}$
NITROGEN DIOXIDE	$6.54 \times 10^{+01}$	$9.80 \times 10^{+01}$	$1.76 \times 10^{+01}$	$7.04 \times 10^{+01}$	$2.51 \times 10^{+02}$
OXIDES OF NITROGEN	$1.31 \times 10^{+03}$	$1.96 \times 10^{+03}$	$3.52 \times 10^{+02}$	$1.41 \times 10^{+03}$	$5.03 \times 10^{+03}$
PARTICULATE MATTER < 10 µm	$2.26 \times 10^{+01}$	$3.39 \times 10^{+01}$	6.09	$2.44 \times 10^{+01}$	$8.70 \times 10^{+01}$
PARTICULATE MATTER < 2.5 µm	$2.12 \times 10^{+01}$	$3.18 \times 10^{+01}$	5.71	$2.29 \times 10^{+01}$	$8.16 \times 10^{+01}$
PHENANTHRENE	6.62×10^{-03}	9.93×10^{-03}	1.78×10^{-03}	7.13×10^{-03}	2.55×10^{-02}
POLYCYCLIC AROMATIC HYDROCARBONS	1.95×10^{-01}	2.93×10^{-01}	5.26×10^{-02}	2.10×10^{-01}	7.51×10^{-01}
PROPIONALDEHYDE	1.30×10^{-01}	1.95×10^{-01}	3.50×10^{-02}	1.40×10^{-01}	5.00×10^{-01}
PROPYLENE	3.33	5.00	8.97×10^{-01}	3.59	$1.28 \times 10^{+01}$
PYRENE	1.57×10^{-03}	2.36×10^{-03}	4.24×10^{-04}	1.69×10^{-03}	6.05×10^{-03}
RETENE	8.88×10^{-04}	1.33×10^{-03}	2.39×10^{-04}	9.57×10^{-04}	3.42×10^{-03}
SELENIUM AND COMPOUNDS	8.53×10^{-04}	1.28×10^{-03}	2.30×10^{-04}	9.19×10^{-04}	3.28×10^{-03}
STYRENE	4.47×10^{-02}	6.71×10^{-02}	1.20×10^{-02}	4.82×10^{-02}	1.72×10^{-01}
SULFUR DIOXIDE	$7.55 \times 10^{+02}$	$1.13 \times 10^{+03}$	$2.03 \times 10^{+02}$	$8.13 \times 10^{+02}$	$2.90 \times 10^{+03}$
TOLUENE	6.82×10^{-02}	1.02×10^{-01}	1.84×10^{-02}	7.34×10^{-02}	2.62×10^{-01}
TOTAL SUSPENDED PARTICULATES	$2.38 \times 10^{+01}$	$3.57 \times 10^{+01}$	6.41	$2.57 \times 10^{+01}$	$9.16 \times 10^{+01}$
TOTAL VOCS	$2.13 \times 10^{+01}$	$3.20 \times 10^{+01}$	5.74	$2.29 \times 10^{+01}$	$8.19 \times 10^{+01}$
ZINC AND COMPOUNDS	2.23×10^{-03}	3.35×10^{-03}	6.01×10^{-04}	2.41×10^{-03}	8.59×10^{-03}

Table C1.13: Annual Emissions from Commercial Ships – Auxiliary Engine

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
1,2,4-TRIMETHYLBENZENE	1.83×10^{-01}	2.74×10^{-01}	4.92×10^{-02}	1.97×10^{-01}	7.03×10^{-01}
1,3,5-TRIMETHYLBENZENE	5.41×10^{-02}	8.11×10^{-02}	1.46×10^{-02}	5.82×10^{-02}	2.08×10^{-01}
1,3-BUTADIENE	6.44×10^{-02}	9.66×10^{-02}	1.73×10^{-02}	6.94×10^{-02}	2.48×10^{-01}
1-METHYL-3-ETHYLBENZENE	4.36×10^{-02}	6.55×10^{-02}	1.17×10^{-02}	4.70×10^{-02}	1.68×10^{-01}
1-METHYL-4-ETHYLBENZENE	1.08×10^{-01}	1.62×10^{-01}	2.91×10^{-02}	1.16×10^{-01}	4.16×10^{-01}
1-METHYLNAPHTHALENE	7.86×10^{-02}	1.18×10^{-01}	2.12×10^{-02}	8.46×10^{-02}	3.02×10^{-01}
1-METHYLPHENANTHRENE	3.53×10^{-03}	5.30×10^{-03}	9.52×10^{-04}	3.81×10^{-03}	1.36×10^{-02}
2,2,4-TRIMETHYLPENTANE	2.58×10^{-01}	3.87×10^{-01}	6.94×10^{-02}	2.78×10^{-01}	9.91×10^{-01}
2,2-DIMETHYLBUTANE	6.44×10^{-02}	9.66×10^{-02}	1.73×10^{-02}	6.94×10^{-02}	2.48×10^{-01}
2,3,4-TRIMETHYLPENTANE	6.44×10^{-02}	9.66×10^{-02}	1.73×10^{-02}	6.94×10^{-02}	2.48×10^{-01}
2,3-DIMETHYLBUTANE	1.18×10^{-01}	1.78×10^{-01}	3.19×10^{-02}	1.28×10^{-01}	4.56×10^{-01}
2,3-DIMETHYLHEXANE	3.33×10^{-02}	4.99×10^{-02}	8.96×10^{-03}	3.58×10^{-02}	1.28×10^{-01}
2,3-DIMETHYLPENTANE	1.50×10^{-01}	2.25×10^{-01}	4.03×10^{-02}	1.61×10^{-01}	5.76×10^{-01}
2,4-DIMETHYLHEXANE	1.04×10^{-02}	1.56×10^{-02}	2.80×10^{-03}	1.12×10^{-02}	4.00×10^{-02}
2,4-DIMETHYLPENTANE	8.52×10^{-02}	1.28×10^{-01}	2.29×10^{-02}	9.18×10^{-02}	3.28×10^{-01}
2,5-DIMETHYLHEXANE	1.04×10^{-02}	1.56×10^{-02}	2.80×10^{-03}	1.12×10^{-02}	4.00×10^{-02}
2-METHYL-1-BUTENE	5.41×10^{-02}	8.11×10^{-02}	1.46×10^{-02}	5.82×10^{-02}	2.08×10^{-01}
2-METHYL-2-PENTENE	4.36×10^{-02}	6.55×10^{-02}	1.17×10^{-02}	4.70×10^{-02}	1.68×10^{-01}
2-METHYL-2-PROPENAL	8.31×10^{-01}	1.25	2.24×10^{-01}	8.95×10^{-01}	3.20
2-METHYLANTHRACENE	2.15×10^{-03}	3.23×10^{-03}	5.79×10^{-04}	2.32×10^{-03}	8.27×10^{-03}
2-METHYLCHOLANTHRENE	1.49×10^{-02}	2.24×10^{-02}	4.02×10^{-03}	1.61×10^{-02}	5.75×10^{-02}
2-METHYLHEPTANE	2.08×10^{-02}	3.12×10^{-02}	5.60×10^{-03}	2.24×10^{-02}	7.99×10^{-02}
2-METHYLHEXANE	1.18×10^{-01}	1.78×10^{-01}	3.19×10^{-02}	1.28×10^{-01}	4.56×10^{-01}
2-METHYLNAPHTHALENE	1.27×10^{-01}	1.91×10^{-01}	3.42×10^{-02}	1.37×10^{-01}	4.88×10^{-01}
2-METHYLPENTANE	1.93×10^{-01}	2.90×10^{-01}	5.20×10^{-02}	2.08×10^{-01}	7.44×10^{-01}
3-ETHYLHEXANE	4.36×10^{-02}	6.55×10^{-02}	1.17×10^{-02}	4.70×10^{-02}	1.68×10^{-01}
3-METHYL-1-BUTENE	3.33×10^{-02}	4.99×10^{-02}	8.96×10^{-03}	3.58×10^{-02}	1.28×10^{-01}
3-METHYLHEXANE	6.44×10^{-02}	9.66×10^{-02}	1.73×10^{-02}	6.94×10^{-02}	2.48×10^{-01}
3-METHYLPENTANE	1.39×10^{-01}	2.09×10^{-01}	3.75×10^{-02}	1.50×10^{-01}	5.36×10^{-01}
3-METHYLPHENANTHRENE	6.30×10^{-03}	9.45×10^{-03}	1.70×10^{-03}	6.78×10^{-03}	2.42×10^{-02}
9-METHYLPHENANTHRENE	4.76×10^{-03}	7.15×10^{-03}	1.28×10^{-03}	5.13×10^{-03}	1.83×10^{-02}
ACENAPHTHENE	3.48×10^{-02}	5.22×10^{-02}	9.38×10^{-03}	3.75×10^{-02}	1.34×10^{-01}
ACENAPHTHYLENE	2.92×10^{-02}	4.38×10^{-02}	7.87×10^{-03}	3.15×10^{-02}	1.12×10^{-01}
ACETALDEHYDE	8.69	$1.30 \times 10^{+01}$	2.34	9.36	$3.34 \times 10^{+01}$
ACETOPHENONE	1.06	1.59	2.85×10^{-01}	1.14	4.08
ACETYLENE	9.56×10^{-01}	1.43	2.57×10^{-01}	1.03	3.68
ACROLEIN	7.07×10^{-01}	1.06	1.90×10^{-01}	7.61×10^{-01}	2.72
ANTHRACENE	5.52×10^{-03}	8.27×10^{-03}	1.48×10^{-03}	5.94×10^{-03}	2.12×10^{-02}
ANTIMONY AND COMPOUNDS	1.01×10^{-03}	1.51×10^{-03}	2.72×10^{-04}	1.09×10^{-03}	3.88×10^{-03}
ARSENIC AND COMPOUNDS	2.84×10^{-03}	4.26×10^{-03}	7.64×10^{-04}	3.06×10^{-03}	1.09×10^{-02}
BENZALDEHYDE	7.90×10^{-01}	1.18	2.13×10^{-01}	8.51×10^{-01}	3.04
BENZENE	5.70×10^{-01}	8.54×10^{-01}	1.53×10^{-01}	6.13×10^{-01}	2.19
BENZO(A)ANTHRACENE	6.81×10^{-03}	1.02×10^{-02}	1.83×10^{-03}	7.34×10^{-03}	2.62×10^{-02}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
BENZO(A)PYRENE	5.55×10^{-03}	8.33×10^{-03}	1.49×10^{-03}	5.98×10^{-03}	2.14×10^{-02}
BENZO(B)FLUORANTHENE	3.08×10^{-03}	4.62×10^{-03}	8.30×10^{-04}	3.32×10^{-03}	1.19×10^{-02}
BENZO(E)PYRENE	3.28×10^{-03}	4.92×10^{-03}	8.82×10^{-04}	3.53×10^{-03}	1.26×10^{-02}
BENZO(G,H,I)FLUORANTHENE	1.19×10^{-03}	1.79×10^{-03}	3.21×10^{-04}	1.28×10^{-03}	4.58×10^{-03}
BENZO(G,H,I,)PERYLENE	2.31×10^{-03}	3.46×10^{-03}	6.21×10^{-04}	2.48×10^{-03}	8.87×10^{-03}
BENZO(K)FLUORANTHENE	2.97×10^{-03}	4.46×10^{-03}	8.00×10^{-04}	3.20×10^{-03}	1.14×10^{-02}
BERYLLIUM AND COMPOUNDS	2.03×10^{-03}	3.05×10^{-03}	5.47×10^{-04}	2.19×10^{-03}	7.81×10^{-03}
BUTYRALDEHYDE	2.70×10^{-01}	4.05×10^{-01}	7.28×10^{-02}	2.91×10^{-01}	1.04
CADMIUM AND COMPOUNDS	7.19×10^{-05}	1.08×10^{-04}	1.94×10^{-05}	7.75×10^{-05}	2.77×10^{-04}
CARBON MONOXIDE	$1.58 \times 10^{+02}$	$2.37 \times 10^{+02}$	$4.26 \times 10^{+01}$	$1.70 \times 10^{+02}$	$6.09 \times 10^{+02}$
CHROMIUM (III) COMPOUNDS	7.60×10^{-05}	1.14×10^{-04}	2.04×10^{-05}	8.18×10^{-05}	2.92×10^{-04}
CHROMIUM (VI) COMPOUNDS	3.15×10^{-05}	4.72×10^{-05}	8.47×10^{-06}	3.39×10^{-05}	1.21×10^{-04}
CHRYSENE	3.71×10^{-03}	5.56×10^{-03}	9.99×10^{-04}	3.99×10^{-03}	1.43×10^{-02}
CIS-2-BUTENE	5.41×10^{-02}	8.11×10^{-02}	1.46×10^{-02}	5.82×10^{-02}	2.08×10^{-01}
CIS-2-HEXENE	2.08×10^{-02}	3.12×10^{-02}	5.60×10^{-03}	2.24×10^{-02}	7.99×10^{-02}
COBALT AND COMPOUNDS	1.84×10^{-03}	2.76×10^{-03}	4.96×10^{-04}	1.98×10^{-03}	7.09×10^{-03}
COPPER AND COMPOUNDS	1.74×10^{-03}	2.62×10^{-03}	4.70×10^{-04}	1.88×10^{-03}	6.71×10^{-03}
CORONENE	1.54×10^{-04}	2.31×10^{-04}	4.14×10^{-05}	1.66×10^{-04}	5.92×10^{-04}
CROTONALDEHYDE	2.79	4.18	7.50×10^{-01}	3.00	$1.07 \times 10^{+01}$
CYCLOHEXANE	4.36×10^{-02}	6.55×10^{-02}	1.17×10^{-02}	4.70×10^{-02}	1.68×10^{-01}
CYCLOPENTA(C,D)PYRENE	5.08×10^{-03}	7.62×10^{-03}	1.37×10^{-03}	5.47×10^{-03}	1.95×10^{-02}
CYCLOPENTANE	8.52×10^{-02}	1.28×10^{-01}	2.29×10^{-02}	9.18×10^{-02}	3.28×10^{-01}
CYCLOPENTENE	4.36×10^{-02}	6.55×10^{-02}	1.17×10^{-02}	4.70×10^{-02}	1.68×10^{-01}
DECANOIC ACID	1.51×10^{-02}	2.27×10^{-02}	4.08×10^{-03}	1.63×10^{-02}	5.82×10^{-02}
DECYLCYCLOHEXANE	7.95×10^{-03}	1.19×10^{-02}	2.14×10^{-03}	8.56×10^{-03}	3.06×10^{-02}
DIACETYL	1.87×10^{-01}	2.81×10^{-01}	5.04×10^{-02}	2.01×10^{-01}	7.20×10^{-01}
DIBENZO(A,H)ANTHRACENE	2.99×10^{-03}	4.48×10^{-03}	8.05×10^{-04}	3.22×10^{-03}	1.15×10^{-02}
DIBENZOFURAN	5.95×10^{-03}	8.93×10^{-03}	1.60×10^{-03}	6.41×10^{-03}	2.29×10^{-02}
EICOSANE	4.28×10^{-02}	6.43×10^{-02}	1.15×10^{-02}	4.61×10^{-02}	1.65×10^{-01}
ETHYLBENZENE	9.77×10^{-02}	1.47×10^{-01}	2.63×10^{-02}	1.05×10^{-01}	3.76×10^{-01}
ETHYLENE	1.78	2.67	4.79×10^{-01}	1.92	6.84
FLUORANTHENE	2.61×10^{-03}	3.91×10^{-03}	7.02×10^{-04}	2.81×10^{-03}	1.00×10^{-02}
FLUORENE	2.19×10^{-02}	3.29×10^{-02}	5.90×10^{-03}	2.36×10^{-02}	8.43×10^{-02}
FORMALDEHYDE	4.64	6.95	1.25	4.99	$1.78 \times 10^{+01}$
GLYOXAL	4.36×10^{-01}	6.55×10^{-01}	1.18×10^{-01}	4.70×10^{-01}	1.68
HEPTADECANE	1.28×10^{-01}	1.91×10^{-01}	3.44×10^{-02}	1.37×10^{-01}	4.91×10^{-01}
HEPTANAL	6.65×10^{-01}	9.98×10^{-01}	1.79×10^{-01}	7.16×10^{-01}	2.56
HEPTYLCYCLOHEXANE	4.15×10^{-03}	6.22×10^{-03}	1.12×10^{-03}	4.47×10^{-03}	1.60×10^{-02}
HEXADECANE	1.48×10^{-01}	2.22×10^{-01}	3.98×10^{-02}	1.59×10^{-01}	5.68×10^{-01}
HEXALDEHYDE	4.57×10^{-01}	6.86×10^{-01}	1.23×10^{-01}	4.92×10^{-01}	1.76
HEXYLCYCLOHEXANE	3.11×10^{-03}	4.67×10^{-03}	8.38×10^{-04}	3.35×10^{-03}	1.20×10^{-02}
INDENO(1,2,3-C,D)PYRENE	4.31×10^{-03}	6.47×10^{-03}	1.16×10^{-03}	4.64×10^{-03}	1.66×10^{-02}
ISOBUTYLENE	2.37×10^{-01}	3.55×10^{-01}	6.38×10^{-02}	2.55×10^{-01}	9.11×10^{-01}
ISOMERS OF XYLENE	6.57×10^{-01}	9.85×10^{-01}	1.77×10^{-01}	7.07×10^{-01}	2.53

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
ISOPENTANE	5.70×10^{-01}	8.54×10^{-01}	1.53×10^{-01}	6.13×10^{-01}	2.19
LAURIC ACID	1.22×10^{-02}	1.83×10^{-02}	3.28×10^{-03}	1.31×10^{-02}	4.68×10^{-02}
LEAD AND COMPOUNDS	6.11×10^{-04}	9.17×10^{-04}	1.65×10^{-04}	6.58×10^{-04}	2.35×10^{-03}
MANGANESE AND COMPOUNDS	6.70×10^{-05}	1.01×10^{-04}	1.80×10^{-05}	7.22×10^{-05}	2.58×10^{-04}
MERCURY AND COMPOUNDS	6.57×10^{-05}	9.86×10^{-05}	1.77×10^{-05}	7.08×10^{-05}	2.53×10^{-04}
METHYL ETHYL KETONE	1.56	2.34	4.20×10^{-01}	1.68	6.00
METHYLCYCLOHEXANE	1.08×10^{-01}	1.62×10^{-01}	2.91×10^{-02}	1.16×10^{-01}	4.16×10^{-01}
METHYLCYCLOPENTANE	1.29×10^{-01}	1.93×10^{-01}	3.47×10^{-02}	1.39×10^{-01}	4.96×10^{-01}
METHYLGLYOXAL	3.53×10^{-01}	5.30×10^{-01}	9.51×10^{-02}	3.81×10^{-01}	1.36
MYRISTIC ACID	1.11×10^{-03}	1.67×10^{-03}	3.00×10^{-04}	1.20×10^{-03}	4.28×10^{-03}
NAPHTHALENE	1.64×10^{-01}	2.45×10^{-01}	4.41×10^{-02}	1.76×10^{-01}	6.29×10^{-01}
N-BUTANE	7.96×10^{-01}	1.19	2.14×10^{-01}	8.57×10^{-01}	3.06
N-DODECANE	1.05×10^{-01}	1.57×10^{-01}	2.82×10^{-02}	1.13×10^{-01}	4.02×10^{-01}
N-HENEICOSANE	1.37×10^{-02}	2.05×10^{-02}	3.68×10^{-03}	1.47×10^{-02}	5.26×10^{-02}
N-HEPTANE	9.77×10^{-02}	1.47×10^{-01}	2.63×10^{-02}	1.05×10^{-01}	3.76×10^{-01}
NICKEL AND COMPOUNDS	2.15×10^{-04}	3.23×10^{-04}	5.79×10^{-05}	2.32×10^{-04}	8.28×10^{-04}
NITRIC OXIDE	$1.85 \times 10^{+02}$	$2.77 \times 10^{+02}$	$4.98 \times 10^{+01}$	$1.99 \times 10^{+02}$	$7.11 \times 10^{+02}$
NITROGEN DIOXIDE	$1.49 \times 10^{+01}$	$2.24 \times 10^{+01}$	4.02	$1.61 \times 10^{+01}$	$5.74 \times 10^{+01}$
N-NONANE	3.33×10^{-02}	4.99×10^{-02}	8.96×10^{-03}	3.58×10^{-02}	1.28×10^{-01}
N-NONYLCYCLOHEXANE	5.15×10^{-03}	7.72×10^{-03}	1.39×10^{-03}	5.54×10^{-03}	1.98×10^{-02}
N-OCTANE	5.41×10^{-02}	8.11×10^{-02}	1.46×10^{-02}	5.82×10^{-02}	2.08×10^{-01}
NONADECANE	8.54×10^{-02}	1.28×10^{-01}	2.30×10^{-02}	9.20×10^{-02}	3.29×10^{-01}
NONANOIC ACID	4.99×10^{-02}	7.49×10^{-02}	1.34×10^{-02}	5.37×10^{-02}	1.92×10^{-01}
N-PENTANE	3.87×10^{-01}	5.80×10^{-01}	1.04×10^{-01}	4.16×10^{-01}	1.49
N-PROPYLBENZENE	2.08×10^{-02}	3.12×10^{-02}	5.60×10^{-03}	2.24×10^{-02}	7.99×10^{-02}
N-TRIDECANE	9.92×10^{-02}	1.49×10^{-01}	2.67×10^{-02}	1.07×10^{-01}	3.81×10^{-01}
OCTADECANE	1.25×10^{-01}	1.87×10^{-01}	3.36×10^{-02}	1.35×10^{-01}	4.81×10^{-01}
OCTANAL	6.44×10^{-01}	9.67×10^{-01}	1.73×10^{-01}	6.94×10^{-01}	2.48
OCTANOIC ACID	2.60×10^{-02}	3.90×10^{-02}	6.99×10^{-03}	2.80×10^{-02}	9.99×10^{-02}
OCTYLCYCLOHEXANE	5.46×10^{-03}	8.18×10^{-03}	1.47×10^{-03}	5.87×10^{-03}	2.10×10^{-02}
OXIDES OF NITROGEN	$2.99 \times 10^{+02}$	$4.48 \times 10^{+02}$	$8.04 \times 10^{+01}$	$3.21 \times 10^{+02}$	$1.15 \times 10^{+03}$
PARTICULATE MATTER < 10 µm	$3.29 \times 10^{+01}$	$4.93 \times 10^{+01}$	8.84	$3.54 \times 10^{+01}$	$1.26 \times 10^{+02}$
PARTICULATE MATTER < 2.5 µm	$3.19 \times 10^{+01}$	$4.78 \times 10^{+01}$	8.58	$3.43 \times 10^{+01}$	$1.23 \times 10^{+02}$
PENTADECANE	8.27×10^{-02}	1.24×10^{-01}	2.23×10^{-02}	8.91×10^{-02}	3.18×10^{-01}
PENTYLCYCLOHEXANE	1.74×10^{-02}	2.62×10^{-02}	4.70×10^{-03}	1.88×10^{-02}	6.71×10^{-02}
PHENANTHRENE	1.84×10^{-02}	2.75×10^{-02}	4.94×10^{-03}	1.98×10^{-02}	7.06×10^{-02}
POLYCHLORINATED DIOXINS AND FURANS	3.52×10^{-08}	5.28×10^{-08}	9.47×10^{-09}	3.79×10^{-08}	1.35×10^{-07}
POLYCYCLIC AROMATIC HYDROCARBONS	3.19×10^{-01}	4.79×10^{-01}	8.60×10^{-02}	3.44×10^{-01}	1.23
PROPIONALDEHYDE	2.91	4.36	7.83×10^{-01}	3.13	$1.12 \times 10^{+01}$
PROPYLENE	1.62×10^{-01}	2.43×10^{-01}	4.36×10^{-02}	1.75×10^{-01}	6.24×10^{-01}
PYRENE	1.44×10^{-03}	2.16×10^{-03}	3.88×10^{-04}	1.55×10^{-03}	5.55×10^{-03}
RETENE	1.60×10^{-03}	2.41×10^{-03}	4.32×10^{-04}	1.73×10^{-03}	6.17×10^{-03}
SELENIUM AND COMPOUNDS	1.24×10^{-03}	1.86×10^{-03}	3.33×10^{-04}	1.33×10^{-03}	4.76×10^{-03}
SULFUR DIOXIDE	$6.36 \times 10^{+01}$	$9.55 \times 10^{+01}$	$1.71 \times 10^{+01}$	$6.85 \times 10^{+01}$	$2.45 \times 10^{+02}$

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
TETRADECANE	1.31×10^{-01}	1.96×10^{-01}	3.52×10^{-02}	1.41×10^{-01}	5.03×10^{-01}
TOLUENE	8.27×10^{-01}	1.24	2.23×10^{-01}	8.91×10^{-01}	3.18
TOTAL SUSPENDED PARTICULATES	$3.46 \times 10^{+01}$	$5.19 \times 10^{+01}$	9.31	$3.72 \times 10^{+01}$	$1.33 \times 10^{+02}$
TOTAL VOCS	$3.85 \times 10^{+01}$	$5.77 \times 10^{+01}$	$1.04 \times 10^{+01}$	$4.14 \times 10^{+01}$	$1.48 \times 10^{+02}$
TRANS-2-BUTENE	1.08×10^{-01}	1.62×10^{-01}	2.91×10^{-02}	1.16×10^{-01}	4.16×10^{-01}
TRANS-2-HEXENE	3.33×10^{-02}	4.99×10^{-02}	8.96×10^{-03}	3.58×10^{-02}	1.28×10^{-01}
TRANS-2-PENTENE	1.04×10^{-02}	1.56×10^{-02}	2.80×10^{-03}	1.12×10^{-02}	4.00×10^{-02}
TRIDECANOIC ACID	2.73×10^{-03}	4.09×10^{-03}	7.34×10^{-04}	2.94×10^{-03}	1.05×10^{-02}
UNDECANOIC ACID	4.28×10^{-02}	6.43×10^{-02}	1.15×10^{-02}	4.61×10^{-02}	1.65×10^{-01}
ZINC AND COMPOUNDS	3.24×10^{-03}	4.86×10^{-03}	8.73×10^{-04}	3.49×10^{-03}	1.25×10^{-02}

Table C1.14: Annual Emissions from Construction Off-Road Vehicles and Equipment – 2-Stroke and 4-Stroke Petrol

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
1,1,1-TRICHLOROETHANE	1.89×10^{-02}	1.40×10^{-03}	5.06×10^{-04}	3.33×10^{-03}	2.41×10^{-02}
1,1,2-TRICHLOROETHANE	1.54×10^{-02}	1.14×10^{-03}	4.12×10^{-04}	2.71×10^{-03}	1.96×10^{-02}
1,2,3-TRIMETHYLBENZENE	2.46×10^{-01}	1.82×10^{-02}	6.60×10^{-03}	4.34×10^{-02}	3.14×10^{-01}
1,2,4-TRIMETHYLBENZENE	8.81×10^{-01}	6.53×10^{-02}	2.36×10^{-02}	1.55×10^{-01}	1.13
1,2-DIETHYLBENZENE	2.04×10^{-01}	1.51×10^{-02}	5.46×10^{-03}	3.59×10^{-02}	2.60×10^{-01}
1,3,5-TRIMETHYLBENZENE	6.72×10^{-01}	4.98×10^{-02}	1.80×10^{-02}	1.18×10^{-01}	8.58×10^{-01}
1,3-BUTADIENE	1.19×10^{-01}	8.80×10^{-03}	3.19×10^{-03}	2.09×10^{-02}	1.52×10^{-01}
1,4-BUTANEDIOL	1.76×10^{-03}	1.30×10^{-04}	4.71×10^{-05}	3.10×10^{-04}	2.24×10^{-03}
1-BUTENE	1.76×10^{-02}	1.30×10^{-03}	4.71×10^{-04}	3.10×10^{-03}	2.24×10^{-02}
1-BUTYNE	8.78×10^{-04}	6.50×10^{-05}	2.36×10^{-05}	1.55×10^{-04}	1.12×10^{-03}
1-CHLOROBUTANE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
1-DECENE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
1-HEXENE	6.69×10^{-02}	4.95×10^{-03}	1.79×10^{-03}	1.18×10^{-02}	8.54×10^{-02}
1-METHYL-3-ISOPROPYLBENZENE	1.55×10^{-01}	1.15×10^{-02}	4.16×10^{-03}	2.73×10^{-02}	1.98×10^{-01}
1-METHYL-3-PROPYLBENZENE	1.19×10^{-01}	8.78×10^{-03}	3.18×10^{-03}	2.09×10^{-02}	1.51×10^{-01}
1-PENTENE	5.78×10^{-02}	4.28×10^{-03}	1.55×10^{-03}	1.02×10^{-02}	7.38×10^{-02}
2,2,4-TRIMETHYLPENTANE	1.47	1.09×10^{-01}	3.94×10^{-02}	2.59×10^{-01}	1.88
2,2,5-TRIMETHYLHEXANE	1.46×10^{-01}	1.08×10^{-02}	3.91×10^{-03}	2.57×10^{-02}	1.86×10^{-01}
2,2-DICHLORONITROANILINE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
2,2-DIMETHYLBUTANE	2.16×10^{-01}	1.60×10^{-02}	5.79×10^{-03}	3.80×10^{-02}	2.76×10^{-01}
2,2-DIMETHYLHEXANE	2.13×10^{-02}	1.58×10^{-03}	5.71×10^{-04}	3.75×10^{-03}	2.72×10^{-02}
2,3,3-TRIMETHYLPENTANE	3.34×10^{-01}	2.48×10^{-02}	8.97×10^{-03}	5.89×10^{-02}	4.27×10^{-01}
2,3,4-TRIMETHYLPENTANE	3.34×10^{-02}	2.48×10^{-03}	8.97×10^{-04}	5.89×10^{-03}	4.27×10^{-02}
2,3,5-TRIMETHYLHEXANE	3.34×10^{-02}	2.48×10^{-03}	8.97×10^{-04}	5.89×10^{-03}	4.27×10^{-02}
2,3-DIMETHYLBUTANE	1.61×10^{-01}	1.19×10^{-02}	4.32×10^{-03}	2.84×10^{-02}	2.06×10^{-01}
2,3-DIMETHYLPENTANE	3.80×10^{-01}	2.81×10^{-02}	1.02×10^{-02}	6.70×10^{-02}	4.85×10^{-01}
2,4,4-TRIMETHYL-1-PENTENE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
2,4,5-TRIMETHYLHEPTANE	1.37×10^{-01}	1.01×10^{-02}	3.67×10^{-03}	2.41×10^{-02}	1.75×10^{-01}
2,4-DIMETHYLHEPTANE	3.95×10^{-02}	2.93×10^{-03}	1.06×10^{-03}	6.96×10^{-03}	5.05×10^{-02}
2,4-DIMETHYLHEXANE	2.63×10^{-03}	1.95×10^{-04}	7.07×10^{-05}	4.64×10^{-04}	3.36×10^{-03}
2,4-DIMETHYLOCTANE	3.04×10^{-02}	2.25×10^{-03}	8.15×10^{-04}	5.36×10^{-03}	3.88×10^{-02}
2,4-DIMETHYLPENTANE	1.61×10^{-01}	1.19×10^{-02}	4.32×10^{-03}	2.84×10^{-02}	2.06×10^{-01}
2,5-DIMETHYLHEXANE	1.91×10^{-01}	1.42×10^{-02}	5.14×10^{-03}	3.37×10^{-02}	2.45×10^{-01}
2-BUTYNE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
2-FURFURAL	1.62×10^{-02}	1.20×10^{-03}	4.36×10^{-04}	2.86×10^{-03}	2.07×10^{-02}
2-HEXENE	2.43×10^{-02}	1.80×10^{-03}	6.52×10^{-04}	4.29×10^{-03}	3.11×10^{-02}
2-METHYL-1-BUTENE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
2-METHYL-2-BUTENE	1.55×10^{-01}	1.15×10^{-02}	4.16×10^{-03}	2.73×10^{-02}	1.98×10^{-01}
2-METHYL-2-PENTENE	6.99×10^{-02}	5.18×10^{-03}	1.87×10^{-03}	1.23×10^{-02}	8.93×10^{-02}
2-METHYL-3-HEXANONE	3.07×10^{-03}	2.28×10^{-04}	8.24×10^{-05}	5.42×10^{-04}	3.93×10^{-03}
2-METHYLDECANE	4.01×10^{-01}	2.97×10^{-02}	1.08×10^{-02}	7.07×10^{-02}	5.12×10^{-01}
2-METHYLHEPTANE	6.69×10^{-02}	4.95×10^{-03}	1.79×10^{-03}	1.18×10^{-02}	8.54×10^{-02}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
2-METHYLOCTANE	6.08×10^{-03}	4.50×10^{-04}	1.63×10^{-04}	1.07×10^{-03}	7.76×10^{-03}
2-METHYLPENTANE	3.86×10^{-01}	2.86×10^{-02}	1.04×10^{-02}	6.80×10^{-02}	4.93×10^{-01}
3,4-DIMETHYLOCTANE	2.92×10^{-01}	2.16×10^{-02}	7.83×10^{-03}	5.14×10^{-02}	3.73×10^{-01}
3-METHYL-1-BUTENE	5.47×10^{-02}	4.05×10^{-03}	1.47×10^{-03}	9.64×10^{-03}	6.99×10^{-02}
3-METHYLHEPTANE	1.09×10^{-01}	8.11×10^{-03}	2.93×10^{-03}	1.93×10^{-02}	1.40×10^{-01}
3-METHYLHEXANE	2.80×10^{-01}	2.07×10^{-02}	7.50×10^{-03}	4.93×10^{-02}	3.57×10^{-01}
3-METHYLPENTANE	2.61×10^{-01}	1.94×10^{-02}	7.01×10^{-03}	4.61×10^{-02}	3.34×10^{-01}
4-METHYL-1-PENTENE	7.60×10^{-02}	5.63×10^{-03}	2.04×10^{-03}	1.34×10^{-02}	9.70×10^{-02}
4-METHYLANILINE	1.32×10^{-03}	9.76×10^{-05}	3.53×10^{-05}	2.32×10^{-04}	1.68×10^{-03}
4-METHYLHEPTANE	1.58×10^{-01}	1.17×10^{-02}	4.24×10^{-03}	2.79×10^{-02}	2.02×10^{-01}
ACENAPHTHENE	1.23×10^{-03}	9.09×10^{-05}	3.29×10^{-05}	2.16×10^{-04}	1.57×10^{-03}
ACENAPHTHYLENE	2.35×10^{-03}	1.74×10^{-04}	6.30×10^{-05}	4.14×10^{-04}	3.00×10^{-03}
ACETALDEHYDE	7.88×10^{-02}	5.84×10^{-03}	2.11×10^{-03}	1.39×10^{-02}	1.01×10^{-01}
ACETIC ACID	3.21×10^{-02}	2.37×10^{-03}	8.60×10^{-04}	5.65×10^{-03}	4.09×10^{-02}
ACETIC ANHYDRIDE	1.54×10^{-02}	1.14×10^{-03}	4.12×10^{-04}	2.71×10^{-03}	1.96×10^{-02}
ACETONE	6.45×10^{-02}	4.78×10^{-03}	1.73×10^{-03}	1.14×10^{-02}	8.24×10^{-02}
ACETYLENE	6.84×10^{-01}	5.07×10^{-02}	1.83×10^{-02}	1.21×10^{-01}	8.73×10^{-01}
ACROLEIN	1.41×10^{-02}	1.04×10^{-03}	3.77×10^{-04}	2.48×10^{-03}	1.79×10^{-02}
ACRYLIC ACID	1.98×10^{-02}	1.46×10^{-03}	5.30×10^{-04}	3.48×10^{-03}	2.52×10^{-02}
ACRYLONITRILE	2.55×10^{-02}	1.89×10^{-03}	6.83×10^{-04}	4.49×10^{-03}	3.25×10^{-02}
ADIPIC ACID	1.76×10^{-02}	1.30×10^{-03}	4.71×10^{-04}	3.10×10^{-03}	2.24×10^{-02}
ALIPHATICS	4.39×10^{-03}	3.25×10^{-04}	1.18×10^{-04}	7.74×10^{-04}	5.61×10^{-03}
ALKENE KETONE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
ALPHA-PINENE	1.54×10^{-02}	1.14×10^{-03}	4.12×10^{-04}	2.71×10^{-03}	1.96×10^{-02}
ANILINE	3.47×10^{-02}	2.57×10^{-03}	9.30×10^{-04}	6.11×10^{-03}	4.43×10^{-02}
ANTHRACENE	1.34×10^{-03}	9.96×10^{-05}	3.61×10^{-05}	2.37×10^{-04}	1.72×10^{-03}
ANTHRAQUINONE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
BENZALDEHYDE	7.30×10^{-02}	5.40×10^{-03}	1.96×10^{-03}	1.29×10^{-02}	9.32×10^{-02}
BENZENE	1.15	8.54×10^{-02}	3.09×10^{-02}	2.03×10^{-01}	1.47
BENZO(A)ANTHRACENE	6.56×10^{-04}	4.86×10^{-05}	1.76×10^{-05}	1.16×10^{-04}	8.38×10^{-04}
BENZO(A)PYRENE	1.37×10^{-03}	1.01×10^{-04}	3.67×10^{-05}	2.41×10^{-04}	1.75×10^{-03}
BENZO(B)FLUORANTHENE	6.88×10^{-04}	5.10×10^{-05}	1.85×10^{-05}	1.21×10^{-04}	8.79×10^{-04}
BENZO(E)PYRENE	5.39×10^{-03}	3.99×10^{-04}	1.45×10^{-04}	9.50×10^{-04}	6.88×10^{-03}
BENZO(G,H,I,)PERYLENE	3.32×10^{-04}	2.46×10^{-05}	8.89×10^{-06}	5.84×10^{-05}	4.24×10^{-04}
BENZO(K)FLUORANTHENE	5.35×10^{-04}	3.96×10^{-05}	1.44×10^{-05}	9.43×10^{-05}	6.84×10^{-04}
BENZOIC ACID	1.76×10^{-03}	1.30×10^{-04}	4.71×10^{-05}	3.10×10^{-04}	2.24×10^{-03}
BENZYL CHLORIDE	1.84×10^{-02}	1.37×10^{-03}	4.95×10^{-04}	3.25×10^{-03}	2.36×10^{-02}
BETA-PINENE	1.01×10^{-02}	7.48×10^{-04}	2.71×10^{-04}	1.78×10^{-03}	1.29×10^{-02}
BIPHENYL	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
B-PHELLANDRENE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
BROMODINITROBENZENE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
BUTOXYBUTENE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
BUTOXYETHOXYETHANOL ACETATE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
BUTYL ACRYLATE	1.89×10^{-02}	1.40×10^{-03}	5.06×10^{-04}	3.33×10^{-03}	2.41×10^{-02}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
BUTYL BENZOATE	9.22×10^{-03}	6.83×10^{-04}	2.47×10^{-04}	1.63×10^{-03}	1.18×10^{-02}
BUTYL CARBITOL	1.71×10^{-02}	1.27×10^{-03}	4.59×10^{-04}	3.02×10^{-03}	2.19×10^{-02}
BUTYL CELLOSOLVE	1.93×10^{-02}	1.43×10^{-03}	5.18×10^{-04}	3.41×10^{-03}	2.47×10^{-02}
BUTYLCYCLOHEXANE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
BUTYLISOPROPYLPHTHALATE	2.20×10^{-03}	1.63×10^{-04}	5.89×10^{-05}	3.87×10^{-04}	2.80×10^{-03}
BUTYRALDEHYDE	1.93×10^{-02}	1.43×10^{-03}	5.18×10^{-04}	3.41×10^{-03}	2.47×10^{-02}
C10 AROMATIC	8.05×10^{-01}	5.97×10^{-02}	2.16×10^{-02}	1.42×10^{-01}	1.03
C10 OLEFINS	1.32×10^{-03}	9.76×10^{-05}	3.53×10^{-05}	2.32×10^{-04}	1.68×10^{-03}
C10 PARAFFINS	5.78×10^{-02}	4.28×10^{-03}	1.55×10^{-03}	1.02×10^{-02}	7.38×10^{-02}
C2 ALKYL INDAN	1.76×10^{-03}	1.30×10^{-04}	4.71×10^{-05}	3.10×10^{-04}	2.24×10^{-03}
C2 CYCLOHEXANE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
C3 CYCLOHEXANE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
C3/C4/C5 ALKYLBENZENES	1.32×10^{-03}	9.76×10^{-05}	3.53×10^{-05}	2.32×10^{-04}	1.68×10^{-03}
C-3-HEXENE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
C4 SUBSTITUTED CYCLOHEXANE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
C4 SUBSTITUTED CYCLOHEXANONE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
C5 ESTER	8.78×10^{-04}	6.50×10^{-05}	2.36×10^{-05}	1.55×10^{-04}	1.12×10^{-03}
C5 OLEFIN	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
C5 PARAFFIN	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
C5 SUBSTITUTED CYCLOHEXANE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
C6 SUBSTITUTED CYCLOHEXANE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
C6H18O3SI3	3.95×10^{-03}	2.93×10^{-04}	1.06×10^{-04}	6.96×10^{-04}	5.05×10^{-03}
C-7 CYCLOPARAFFINS	3.12×10^{-02}	2.31×10^{-03}	8.36×10^{-04}	5.49×10^{-03}	3.98×10^{-02}
C7-C16 PARAFFINS	6.59×10^{-03}	4.88×10^{-04}	1.77×10^{-04}	1.16×10^{-03}	8.41×10^{-03}
C-8 CYCLOPARAFFINS	2.20×10^{-03}	1.63×10^{-04}	5.89×10^{-05}	3.87×10^{-04}	2.80×10^{-03}
C8 PARAFFIN	8.78×10^{-04}	6.50×10^{-05}	2.36×10^{-05}	1.55×10^{-04}	1.12×10^{-03}
C8H24O4SI4	1.32×10^{-03}	9.76×10^{-05}	3.53×10^{-05}	2.32×10^{-04}	1.68×10^{-03}
CAMPHENE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
CARBITOL	2.02×10^{-02}	1.50×10^{-03}	5.42×10^{-04}	3.56×10^{-03}	2.58×10^{-02}
CARBON MONOXIDE	$5.12 \times 10^{+02}$	$3.79 \times 10^{+01}$	$1.37 \times 10^{+01}$	$9.02 \times 10^{+01}$	$6.53 \times 10^{+02}$
CARBON SULFIDE	3.95×10^{-03}	2.93×10^{-04}	1.06×10^{-04}	6.96×10^{-04}	5.05×10^{-03}
CARBON TETRACHLORIDE	2.85×10^{-02}	2.11×10^{-03}	7.65×10^{-04}	5.03×10^{-03}	3.65×10^{-02}
CARBONYL SULFIDE	1.32×10^{-03}	9.76×10^{-05}	3.53×10^{-05}	2.32×10^{-04}	1.68×10^{-03}
CELLOSOLVE	1.58×10^{-02}	1.17×10^{-03}	4.24×10^{-04}	2.79×10^{-03}	2.02×10^{-02}
CELLOSOLVE ACETATE	1.58×10^{-02}	1.17×10^{-03}	4.24×10^{-04}	2.79×10^{-03}	2.02×10^{-02}
CHLOROBENZENE	3.12×10^{-02}	2.31×10^{-03}	8.36×10^{-04}	5.49×10^{-03}	3.98×10^{-02}
CHLORODIFLUOROMETHANE	7.03×10^{-03}	5.20×10^{-04}	1.88×10^{-04}	1.24×10^{-03}	8.97×10^{-03}
CHLOROFORM	2.24×10^{-02}	1.66×10^{-03}	6.01×10^{-04}	3.95×10^{-03}	2.86×10^{-02}
CHLOROPENTAFLUOROETHANE	8.78×10^{-04}	6.50×10^{-05}	2.36×10^{-05}	1.55×10^{-04}	1.12×10^{-03}
CHLOROPRENE	1.49×10^{-02}	1.11×10^{-03}	4.00×10^{-04}	2.63×10^{-03}	1.91×10^{-02}
CHLOROTRIFLUOROMETHANE	2.20×10^{-03}	1.63×10^{-04}	5.89×10^{-05}	3.87×10^{-04}	2.80×10^{-03}
CHROMIUM (III) COMPOUNDS	1.41×10^{-04}	1.04×10^{-05}	3.77×10^{-06}	2.48×10^{-05}	1.80×10^{-04}
CHROMIUM (VI) COMPOUNDS	6.02×10^{-05}	4.46×10^{-06}	1.62×10^{-06}	1.06×10^{-05}	7.69×10^{-05}
CHRYSENE	6.02×10^{-04}	4.46×10^{-05}	1.61×10^{-05}	1.06×10^{-04}	7.69×10^{-04}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
CIS-2-BUTENE	1.40×10^{-01}	1.04×10^{-02}	3.75×10^{-03}	2.46×10^{-02}	1.79×10^{-01}
CIS-2-PENTENE	6.08×10^{-02}	4.50×10^{-03}	1.63×10^{-03}	1.07×10^{-02}	7.76×10^{-02}
COPPER AND COMPOUNDS	6.02×10^{-04}	4.46×10^{-05}	1.62×10^{-05}	1.06×10^{-04}	7.69×10^{-04}
CORONENE	1.41×10^{-04}	1.04×10^{-05}	3.78×10^{-06}	2.48×10^{-05}	1.80×10^{-04}
CREOSOTE	1.62×10^{-02}	1.20×10^{-03}	4.36×10^{-04}	2.86×10^{-03}	2.07×10^{-02}
CRESOL	1.67×10^{-02}	1.24×10^{-03}	4.47×10^{-04}	2.94×10^{-03}	2.13×10^{-02}
CROTONALDEHYDE	2.13×10^{-02}	1.58×10^{-03}	5.71×10^{-04}	3.75×10^{-03}	2.72×10^{-02}
CYCLOHEXANE	4.92×10^{-01}	3.65×10^{-02}	1.32×10^{-02}	8.68×10^{-02}	6.29×10^{-01}
CYCLOHEXANOL	1.98×10^{-02}	1.46×10^{-03}	5.30×10^{-04}	3.48×10^{-03}	2.52×10^{-02}
CYCLOHEXANONE	2.33×10^{-02}	1.72×10^{-03}	6.24×10^{-04}	4.10×10^{-03}	2.97×10^{-02}
CYCLOHEXENE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
CYCLOPENTA(C,D)PYRENE	1.59×10^{-03}	1.18×10^{-04}	4.26×10^{-05}	2.80×10^{-04}	2.03×10^{-03}
CYCLOPENTANE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
CYCLOPENTENE	8.21×10^{-02}	6.08×10^{-03}	2.20×10^{-03}	1.45×10^{-02}	1.05×10^{-01}
DENATURANT	4.39×10^{-03}	3.25×10^{-04}	1.18×10^{-04}	7.74×10^{-04}	5.61×10^{-03}
DIBENZO(A,H)ANTHRACENE	7.77×10^{-04}	5.76×10^{-05}	2.08×10^{-05}	1.37×10^{-04}	9.92×10^{-04}
DIBUTYL PHTHALATE	1.76×10^{-03}	1.30×10^{-04}	4.71×10^{-05}	3.10×10^{-04}	2.24×10^{-03}
DICHLOROBENZENES	8.78×10^{-04}	6.50×10^{-05}	2.36×10^{-05}	1.55×10^{-04}	1.12×10^{-03}
DICHLORODIFLUOROMETHANE	1.54×10^{-02}	1.14×10^{-03}	4.12×10^{-04}	2.71×10^{-03}	1.96×10^{-02}
DICHLOROMETHANE	3.29×10^{-02}	2.44×10^{-03}	8.83×10^{-04}	5.80×10^{-03}	4.21×10^{-02}
DICHLOROTETRAFLUORETHANE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
DIETHYLCYCLOHEXANE	1.32×10^{-03}	9.76×10^{-05}	3.53×10^{-05}	2.32×10^{-04}	1.68×10^{-03}
DIETHYLENE GLYCOL	1.93×10^{-02}	1.43×10^{-03}	5.18×10^{-04}	3.41×10^{-03}	2.47×10^{-02}
DIISOPROPYL BENZENE	1.67×10^{-02}	1.24×10^{-03}	4.47×10^{-04}	2.94×10^{-03}	2.13×10^{-02}
DIMETHYL FORMAMIDE	1.58×10^{-02}	1.17×10^{-03}	4.24×10^{-04}	2.79×10^{-03}	2.02×10^{-02}
DIMETHYL PHTHALATE	2.63×10^{-03}	1.95×10^{-04}	7.07×10^{-05}	4.64×10^{-04}	3.36×10^{-03}
DIMETHYLCYCLOHEXANE	2.20×10^{-03}	1.63×10^{-04}	5.89×10^{-05}	3.87×10^{-04}	2.80×10^{-03}
DIMETHYLCYCLOPENTANE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
DIMETHYLETHER	4.92×10^{-02}	3.64×10^{-03}	1.32×10^{-03}	8.67×10^{-03}	6.28×10^{-02}
DIMETHYLHEXENE	3.95×10^{-02}	2.93×10^{-03}	1.06×10^{-03}	6.96×10^{-03}	5.05×10^{-02}
DIMETHYLOCTANES	1.32×10^{-03}	9.76×10^{-05}	3.53×10^{-05}	2.32×10^{-04}	1.68×10^{-03}
DIPROPYLENE GLYCOL	2.90×10^{-02}	2.15×10^{-03}	7.77×10^{-04}	5.11×10^{-03}	3.70×10^{-02}
D-LIMONENE	2.20×10^{-03}	1.63×10^{-04}	5.89×10^{-05}	3.87×10^{-04}	2.80×10^{-03}
DODECENE	2.20×10^{-02}	1.63×10^{-03}	5.89×10^{-04}	3.87×10^{-03}	2.80×10^{-02}
EPICHLOROHYDRIN	1.84×10^{-02}	1.37×10^{-03}	4.95×10^{-04}	3.25×10^{-03}	2.36×10^{-02}
ETHANE	5.44×10^{-01}	4.03×10^{-02}	1.46×10^{-02}	9.59×10^{-02}	6.95×10^{-01}
ETHANOLAMINE	1.93×10^{-02}	1.43×10^{-03}	5.18×10^{-04}	3.41×10^{-03}	2.47×10^{-02}
ETHYL ACETATE	1.93×10^{-02}	1.43×10^{-03}	5.18×10^{-04}	3.41×10^{-03}	2.47×10^{-02}
ETHYL ACRYLATE	2.20×10^{-02}	1.63×10^{-03}	5.89×10^{-04}	3.87×10^{-03}	2.80×10^{-02}
ETHYL ALCOHOL	5.97×10^{-02}	4.42×10^{-03}	1.60×10^{-03}	1.05×10^{-02}	7.63×10^{-02}
ETHYL CHLORIDE	1.27×10^{-02}	9.43×10^{-04}	3.42×10^{-04}	2.24×10^{-03}	1.63×10^{-02}
ETHYL ETHER	2.72×10^{-02}	2.02×10^{-03}	7.30×10^{-04}	4.80×10^{-03}	3.48×10^{-02}
ETHYL MERCAPTAN	1.45×10^{-02}	1.07×10^{-03}	3.89×10^{-04}	2.55×10^{-03}	1.85×10^{-02}
ETHYL STYRENE	1.32×10^{-03}	9.76×10^{-05}	3.53×10^{-05}	2.32×10^{-04}	1.68×10^{-03}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
ETHYLBENZENE	9.76×10^{-01}	7.23×10^{-02}	2.62×10^{-02}	1.72×10^{-01}	1.25
ETHYLCYCLOHEXANE	8.78×10^{-04}	6.50×10^{-05}	2.36×10^{-05}	1.55×10^{-04}	1.12×10^{-03}
ETHYLCYCLOPENTANE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
ETHYLENE	2.56	1.89×10^{-01}	6.86×10^{-02}	4.51×10^{-01}	3.26
ETHYLENE DIBROMIDE	1.84×10^{-02}	1.37×10^{-03}	4.95×10^{-04}	3.25×10^{-03}	2.36×10^{-02}
ETHYLENE DICHLORIDE	2.55×10^{-02}	1.89×10^{-03}	6.83×10^{-04}	4.49×10^{-03}	3.25×10^{-02}
ETHYLENE GLYCOL	1.62×10^{-02}	1.20×10^{-03}	4.36×10^{-04}	2.86×10^{-03}	2.07×10^{-02}
ETHYLENE OXIDE	1.67×10^{-02}	1.24×10^{-03}	4.47×10^{-04}	2.94×10^{-03}	2.13×10^{-02}
ETHYLENEAMINES	1.93×10^{-02}	1.43×10^{-03}	5.18×10^{-04}	3.41×10^{-03}	2.47×10^{-02}
ETHYLHEPTENE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
ETHYLHEXANE	8.78×10^{-04}	6.50×10^{-05}	2.36×10^{-05}	1.55×10^{-04}	1.12×10^{-03}
ETHYLISOPROPYL ETHER	8.78×10^{-04}	6.50×10^{-05}	2.36×10^{-05}	1.55×10^{-04}	1.12×10^{-03}
ETHYLMETHYLCYCLOHEXANES	8.78×10^{-04}	6.50×10^{-05}	2.36×10^{-05}	1.55×10^{-04}	1.12×10^{-03}
ETHYL-PHENYL-PHENYL-ETHANE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
ETHYLTOLUENE	8.78×10^{-04}	6.50×10^{-05}	2.36×10^{-05}	1.55×10^{-04}	1.12×10^{-03}
FLUORANTHENE	2.68×10^{-03}	1.98×10^{-04}	7.19×10^{-05}	4.72×10^{-04}	3.42×10^{-03}
FLUORENE	4.31×10^{-03}	3.19×10^{-04}	1.15×10^{-04}	7.59×10^{-04}	5.50×10^{-03}
FORMALDEHYDE	1.64×10^{-01}	1.22×10^{-02}	4.41×10^{-03}	2.90×10^{-02}	2.10×10^{-01}
FORMIC ACID	1.84×10^{-02}	1.37×10^{-03}	4.95×10^{-04}	3.25×10^{-03}	2.36×10^{-02}
GLYOXAL	8.78×10^{-04}	6.50×10^{-05}	2.36×10^{-05}	1.55×10^{-04}	1.12×10^{-03}
HEPTENE	2.24×10^{-02}	1.66×10^{-03}	6.01×10^{-04}	3.95×10^{-03}	2.86×10^{-02}
HEXADECANE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
HEXAFLUOROETHANE	1.76×10^{-02}	1.30×10^{-03}	4.71×10^{-04}	3.10×10^{-03}	2.24×10^{-02}
HEXAMETHYLENEDIAMINE	2.94×10^{-02}	2.18×10^{-03}	7.89×10^{-04}	5.18×10^{-03}	3.76×10^{-02}
HEXYLENE GLYCOL	1.58×10^{-02}	1.17×10^{-03}	4.24×10^{-04}	2.79×10^{-03}	2.02×10^{-02}
INDANE	1.64×10^{-01}	1.22×10^{-02}	4.40×10^{-03}	2.89×10^{-02}	2.10×10^{-01}
INDENO(1,2,3-C,D)PYRENE	7.26×10^{-05}	5.38×10^{-06}	1.95×10^{-06}	1.28×10^{-05}	9.27×10^{-05}
ISOBUTANE	1.88×10^{-01}	1.40×10^{-02}	5.05×10^{-03}	3.32×10^{-02}	2.41×10^{-01}
ISOBUTYL ACRYLATE	1.67×10^{-02}	1.24×10^{-03}	4.47×10^{-04}	2.94×10^{-03}	2.13×10^{-02}
ISOBUTYL ALCOHOL	1.84×10^{-02}	1.37×10^{-03}	4.95×10^{-04}	3.25×10^{-03}	2.36×10^{-02}
ISOBUTYL ISOBUTYRATE	1.71×10^{-02}	1.27×10^{-03}	4.59×10^{-04}	3.02×10^{-03}	2.19×10^{-02}
ISOBUTYLBENZENE	1.49×10^{-01}	1.10×10^{-02}	3.99×10^{-03}	2.62×10^{-02}	1.90×10^{-01}
ISOBUTYLENE	4.29×10^{-01}	3.17×10^{-02}	1.15×10^{-02}	7.55×10^{-02}	5.47×10^{-01}
ISOBUTYRALDEHYDE	1.84×10^{-02}	1.37×10^{-03}	4.95×10^{-04}	3.25×10^{-03}	2.36×10^{-02}
ISOMERS OF BUTENE	2.20×10^{-03}	1.63×10^{-04}	5.89×10^{-05}	3.87×10^{-04}	2.80×10^{-03}
ISOMERS OF BUTYLBENZENE	2.63×10^{-03}	1.95×10^{-04}	7.07×10^{-05}	4.64×10^{-04}	3.36×10^{-03}
ISOMERS OF C10H18	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
ISOMERS OF DECANE	1.76×10^{-02}	1.30×10^{-03}	4.71×10^{-04}	3.10×10^{-03}	2.24×10^{-02}
ISOMERS OF DIETHYLBENZENE	1.32×10^{-03}	9.76×10^{-05}	3.53×10^{-05}	2.32×10^{-04}	1.68×10^{-03}
ISOMERS OF DODECANE	2.02×10^{-02}	1.50×10^{-03}	5.42×10^{-04}	3.56×10^{-03}	2.58×10^{-02}
ISOMERS OF ETHYLTOLUENE	1.76×10^{-03}	1.30×10^{-04}	4.71×10^{-05}	3.10×10^{-04}	2.24×10^{-03}
ISOMERS OF HEPTADECANE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
ISOMERS OF HEPTANE	1.10×10^{-02}	8.13×10^{-04}	2.94×10^{-04}	1.93×10^{-03}	1.40×10^{-02}
ISOMERS OF HEXANE	2.37×10^{-02}	1.76×10^{-03}	6.36×10^{-04}	4.18×10^{-03}	3.03×10^{-02}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
ISOMERS OF NONANE	8.34×10^{-03}	6.18×10^{-04}	2.24×10^{-04}	1.47×10^{-03}	1.07×10^{-02}
ISOMERS OF OCTADECANE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
ISOMERS OF OCTANE	6.59×10^{-03}	4.88×10^{-04}	1.77×10^{-04}	1.16×10^{-03}	8.41×10^{-03}
ISOMERS OF PENTADECANE	1.84×10^{-02}	1.37×10^{-03}	4.95×10^{-04}	3.25×10^{-03}	2.36×10^{-02}
ISOMERS OF PENTANE	4.87×10^{-02}	3.61×10^{-03}	1.31×10^{-03}	8.59×10^{-03}	6.22×10^{-02}
ISOMERS OF PENTENE	2.20×10^{-03}	1.63×10^{-04}	5.89×10^{-05}	3.87×10^{-04}	2.80×10^{-03}
ISOMERS OF PROPYLBENZENE	8.78×10^{-04}	6.50×10^{-05}	2.36×10^{-05}	1.55×10^{-04}	1.12×10^{-03}
ISOMERS OF TETRADECANE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
ISOMERS OF UNDECANE	2.20×10^{-03}	1.63×10^{-04}	5.89×10^{-05}	3.87×10^{-04}	2.80×10^{-03}
ISOMERS OF XYLENE	4.30	3.18×10^{-01}	1.15×10^{-01}	7.57×10^{-01}	5.49
ISOPENTANE	1.07	7.90×10^{-02}	2.86×10^{-02}	1.88×10^{-01}	1.36
ISOPRENE	5.17×10^{-02}	3.83×10^{-03}	1.39×10^{-03}	9.11×10^{-03}	6.60×10^{-02}
ISOPROPYL ACETATE	2.06×10^{-02}	1.53×10^{-03}	5.53×10^{-04}	3.64×10^{-03}	2.64×10^{-02}
ISOPROPYL ALCOHOL	3.21×10^{-02}	2.37×10^{-03}	8.60×10^{-04}	5.65×10^{-03}	4.09×10^{-02}
ISOPROPYLBENZENE	1.67×10^{-02}	1.24×10^{-03}	4.47×10^{-04}	2.94×10^{-03}	2.13×10^{-02}
LACTOL SPIRITS	1.58×10^{-02}	1.17×10^{-03}	4.24×10^{-04}	2.79×10^{-03}	2.02×10^{-02}
LEAD AND COMPOUNDS	7.09×10^{-04}	5.25×10^{-05}	1.90×10^{-05}	1.25×10^{-04}	9.05×10^{-04}
MALEIC ANHYDRIDE	3.07×10^{-03}	2.28×10^{-04}	8.24×10^{-05}	5.42×10^{-04}	3.93×10^{-03}
MANGANESE AND COMPOUNDS	4.02×10^{-04}	2.97×10^{-05}	1.08×10^{-05}	7.08×10^{-05}	5.13×10^{-04}
M-DIETHYLBENZENE	1.73×10^{-01}	1.28×10^{-02}	4.65×10^{-03}	3.05×10^{-02}	2.21×10^{-01}
METHANE	3.33	2.47×10^{-01}	8.94×10^{-02}	5.88×10^{-01}	4.26
METHYL ACETATE	3.12×10^{-02}	2.31×10^{-03}	8.36×10^{-04}	5.49×10^{-03}	3.98×10^{-02}
METHYL ACRYLATE	1.67×10^{-02}	1.24×10^{-03}	4.47×10^{-04}	2.94×10^{-03}	2.13×10^{-02}
METHYL ALCOHOL	6.15×10^{-02}	4.55×10^{-03}	1.65×10^{-03}	1.08×10^{-02}	7.85×10^{-02}
METHYL AMYL KETONE	2.24×10^{-02}	1.66×10^{-03}	6.01×10^{-04}	3.95×10^{-03}	2.86×10^{-02}
METHYL CARBITOL	1.71×10^{-02}	1.27×10^{-03}	4.59×10^{-04}	3.02×10^{-03}	2.19×10^{-02}
METHYL CELLOSOLVE	1.71×10^{-02}	1.27×10^{-03}	4.59×10^{-04}	3.02×10^{-03}	2.19×10^{-02}
METHYL ETHYL KETONE	5.36×10^{-02}	3.97×10^{-03}	1.44×10^{-03}	9.44×10^{-03}	6.84×10^{-02}
METHYL FORMATE	9.22×10^{-03}	6.83×10^{-04}	2.47×10^{-04}	1.63×10^{-03}	1.18×10^{-02}
METHYL GLYOXAL	8.78×10^{-04}	6.50×10^{-05}	2.36×10^{-05}	1.55×10^{-04}	1.12×10^{-03}
METHYL ISOBUTYL KETONE	2.46×10^{-02}	1.82×10^{-03}	6.59×10^{-04}	4.33×10^{-03}	3.14×10^{-02}
METHYL METHACRYLATE	2.02×10^{-02}	1.50×10^{-03}	5.42×10^{-04}	3.56×10^{-03}	2.58×10^{-02}
METHYL MYRISTATE	1.32×10^{-03}	9.76×10^{-05}	3.53×10^{-05}	2.32×10^{-04}	1.68×10^{-03}
METHYL NAPHTHALENES	1.76×10^{-03}	1.30×10^{-04}	4.71×10^{-05}	3.10×10^{-04}	2.24×10^{-03}
METHYL PALMITATE	3.51×10^{-03}	2.60×10^{-04}	9.42×10^{-05}	6.19×10^{-04}	4.49×10^{-03}
METHYL STEARATE	4.83×10^{-03}	3.58×10^{-04}	1.30×10^{-04}	8.51×10^{-04}	6.17×10^{-03}
METHYL STYRENE	1.80×10^{-02}	1.33×10^{-03}	4.83×10^{-04}	3.17×10^{-03}	2.30×10^{-02}
METHYL TERT-BUTYL ETHER	7.08	5.24×10^{-01}	1.90×10^{-01}	1.25	9.04
METHYLACETYLENE	5.17×10^{-02}	3.83×10^{-03}	1.39×10^{-03}	9.11×10^{-03}	6.60×10^{-02}
METHYLAL	7.46×10^{-03}	5.53×10^{-04}	2.00×10^{-04}	1.32×10^{-03}	9.53×10^{-03}
METHYLALLENE	1.76×10^{-02}	1.30×10^{-03}	4.71×10^{-04}	3.10×10^{-03}	2.24×10^{-02}
METHYLCYCLOHEXANE	1.43×10^{-01}	1.06×10^{-02}	3.83×10^{-03}	2.52×10^{-02}	1.82×10^{-01}
METHYLCYCLOPENTANE	1.85×10^{-01}	1.37×10^{-02}	4.97×10^{-03}	3.27×10^{-02}	2.37×10^{-01}
METHYLCYCLOPENTENE	6.08×10^{-03}	4.50×10^{-04}	1.63×10^{-04}	1.07×10^{-03}	7.76×10^{-03}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
METHYLDECANES	8.78×10^{-04}	6.50×10^{-05}	2.36×10^{-05}	1.55×10^{-04}	1.12×10^{-03}
METHYLENE BROMIDE	1.32×10^{-03}	9.76×10^{-05}	3.53×10^{-05}	2.32×10^{-04}	1.68×10^{-03}
METHYLHEXANE	1.32×10^{-03}	9.76×10^{-05}	3.53×10^{-05}	2.32×10^{-04}	1.68×10^{-03}
METHYLNONANE	8.78×10^{-04}	6.50×10^{-05}	2.36×10^{-05}	1.55×10^{-04}	1.12×10^{-03}
METHYLOCTANES	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
METHYLPENTANE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
METHYLPROPYLCYCLOHEXANES	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
M-ETHYLTOLUENE	3.80×10^{-01}	2.81×10^{-02}	1.02×10^{-02}	6.70×10^{-02}	4.85×10^{-01}
METHYLUNDECANE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
MINERAL SPIRITS	2.81×10^{-02}	2.08×10^{-03}	7.54×10^{-04}	4.95×10^{-03}	3.59×10^{-02}
MYRCENE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
NAPHTHA	2.06×10^{-02}	1.53×10^{-03}	5.53×10^{-04}	3.64×10^{-03}	2.64×10^{-02}
NAPHTHALENE	6.23×10^{-02}	4.62×10^{-03}	1.67×10^{-03}	1.10×10^{-02}	7.96×10^{-02}
N-BUTANE	1.16	8.58×10^{-02}	3.11×10^{-02}	2.04×10^{-01}	1.48
N-BUTYL ACETATE	2.55×10^{-02}	1.89×10^{-03}	6.83×10^{-04}	4.49×10^{-03}	3.25×10^{-02}
N-BUTYL ALCOHOL	3.03×10^{-02}	2.24×10^{-03}	8.13×10^{-04}	5.34×10^{-03}	3.87×10^{-02}
N-DECANE	6.08×10^{-02}	4.50×10^{-03}	1.63×10^{-03}	1.07×10^{-02}	7.76×10^{-02}
N-DODECANE	8.34×10^{-03}	6.18×10^{-04}	2.24×10^{-04}	1.47×10^{-03}	1.07×10^{-02}
N-HEPTANE	1.61×10^{-01}	1.19×10^{-02}	4.32×10^{-03}	2.84×10^{-02}	2.06×10^{-01}
N-HEXANE	5.70×10^{-01}	4.22×10^{-02}	1.53×10^{-02}	1.00×10^{-01}	7.27×10^{-01}
NICKEL AND COMPOUNDS	2.01×10^{-04}	1.49×10^{-05}	5.39×10^{-06}	3.54×10^{-05}	2.56×10^{-04}
NITRIC OXIDE	7.61	5.64×10^{-01}	2.04×10^{-01}	1.34	9.72
NITROBENZENE	1.45×10^{-02}	1.07×10^{-03}	3.89×10^{-04}	2.55×10^{-03}	1.85×10^{-02}
NITROGEN DIOXIDE	6.14×10^{-01}	4.55×10^{-02}	1.65×10^{-02}	1.08×10^{-01}	7.84×10^{-01}
N-NONANE	7.60×10^{-02}	5.63×10^{-03}	2.04×10^{-03}	1.34×10^{-02}	9.70×10^{-02}
N-OCTANE	9.12×10^{-02}	6.75×10^{-03}	2.45×10^{-03}	1.61×10^{-02}	1.16×10^{-01}
NONENONE	8.78×10^{-04}	6.50×10^{-05}	2.36×10^{-05}	1.55×10^{-04}	1.12×10^{-03}
N-PENTADECANE	7.46×10^{-03}	5.53×10^{-04}	2.00×10^{-04}	1.32×10^{-03}	9.53×10^{-03}
N-PENTANE	4.86×10^{-01}	3.60×10^{-02}	1.30×10^{-02}	8.57×10^{-02}	6.21×10^{-01}
N-PENTYLCYCLOHEXANE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
N-PROPYL ACETATE	2.15×10^{-02}	1.59×10^{-03}	5.77×10^{-04}	3.79×10^{-03}	2.75×10^{-02}
N-PROPYL ALCOHOL	1.84×10^{-02}	1.37×10^{-03}	4.95×10^{-04}	3.25×10^{-03}	2.36×10^{-02}
N-PROPYLBENZENE	1.70×10^{-01}	1.26×10^{-02}	4.57×10^{-03}	3.00×10^{-02}	2.17×10^{-01}
N-TETRADECANE	3.07×10^{-03}	2.28×10^{-04}	8.24×10^{-05}	5.42×10^{-04}	3.93×10^{-03}
N-TRIDECANE	4.39×10^{-03}	3.25×10^{-04}	1.18×10^{-04}	7.74×10^{-04}	5.61×10^{-03}
N-UNDECANE	1.82×10^{-01}	1.35×10^{-02}	4.89×10^{-03}	3.21×10^{-02}	2.33×10^{-01}
OCTAMETHYLCYCLOTETRASILOXANE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
O-DICHLOROBENZENE	1.76×10^{-02}	1.30×10^{-03}	4.71×10^{-04}	3.10×10^{-03}	2.24×10^{-02}
O-ETHYLTOLUENE	7.90×10^{-02}	5.85×10^{-03}	2.12×10^{-03}	1.39×10^{-02}	1.01×10^{-01}
OXIDES OF NITROGEN	$1.23 \times 10^{+01}$	9.10×10^{-01}	3.29×10^{-01}	2.16	$1.57 \times 10^{+01}$
PALMITIC ACID	8.78×10^{-03}	6.50×10^{-04}	2.36×10^{-04}	1.55×10^{-03}	1.12×10^{-02}
PARAFFINS (C16-C34)	8.78×10^{-04}	6.50×10^{-05}	2.36×10^{-05}	1.55×10^{-04}	1.12×10^{-03}
PARTICULATE MATTER < 10 µm	2.01	1.49×10^{-01}	5.39×10^{-02}	3.54×10^{-01}	2.56
PARTICULATE MATTER < 2.5 µm	1.85	1.37×10^{-01}	4.95×10^{-02}	3.26×10^{-01}	2.36

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
P-DICHLOROBENZENE	3.16×10^{-02}	2.34×10^{-03}	8.48×10^{-04}	5.57×10^{-03}	4.04×10^{-02}
PHENANTHRENE	4.03×10^{-03}	2.99×10^{-04}	1.08×10^{-04}	7.11×10^{-04}	5.15×10^{-03}
PHENOL	1.93×10^{-02}	1.43×10^{-03}	5.18×10^{-04}	3.41×10^{-03}	2.47×10^{-02}
PHENYL ISOCYANATE	5.27×10^{-03}	3.90×10^{-04}	1.41×10^{-04}	9.29×10^{-04}	6.73×10^{-03}
PHTHALIC ANHYDRIDE	8.78×10^{-03}	6.50×10^{-04}	2.36×10^{-04}	1.55×10^{-03}	1.12×10^{-02}
PIPERYLENE	1.76×10^{-02}	1.30×10^{-03}	4.71×10^{-04}	3.10×10^{-03}	2.24×10^{-02}
POLYCHLORINATED DIOXINS AND FURANS	1.67×10^{-12}	1.23×10^{-13}	4.47×10^{-14}	2.94×10^{-13}	2.13×10^{-12}
POLYCYCLIC AROMATIC HYDROCARBONS	9.82×10^{-02}	7.27×10^{-03}	2.63×10^{-03}	1.73×10^{-02}	1.25×10^{-01}
PROPADIENE	3.95×10^{-02}	2.93×10^{-03}	1.06×10^{-03}	6.96×10^{-03}	5.05×10^{-02}
PROPANE	1.05×10^{-01}	7.81×10^{-03}	2.83×10^{-03}	1.86×10^{-02}	1.35×10^{-01}
PROPIONALDEHYDE	1.68×10^{-02}	1.25×10^{-03}	4.52×10^{-04}	2.97×10^{-03}	2.15×10^{-02}
PROPIONIC ACID	1.76×10^{-02}	1.30×10^{-03}	4.71×10^{-04}	3.10×10^{-03}	2.24×10^{-02}
PROPYLCYCLOHEXANE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
PROPYLENE	8.75×10^{-01}	6.48×10^{-02}	2.35×10^{-02}	1.54×10^{-01}	1.12
PROPYLENE DICHLORIDE	8.78×10^{-04}	6.50×10^{-05}	2.36×10^{-05}	1.55×10^{-04}	1.12×10^{-03}
PROPYLENE GLYCOL	1.67×10^{-02}	1.24×10^{-03}	4.47×10^{-04}	2.94×10^{-03}	2.13×10^{-02}
PROPYLENE OXIDE	2.20×10^{-02}	1.63×10^{-03}	5.89×10^{-04}	3.87×10^{-03}	2.80×10^{-02}
PYRENE	5.83×10^{-03}	4.32×10^{-04}	1.56×10^{-04}	1.03×10^{-03}	7.44×10^{-03}
RETENE	1.93×10^{-03}	1.43×10^{-04}	5.17×10^{-05}	3.40×10^{-04}	2.46×10^{-03}
S-BUTYL ALCOHOL	1.49×10^{-02}	1.11×10^{-03}	4.00×10^{-04}	2.63×10^{-03}	1.91×10^{-02}
S-BUTYLBENZENE	5.17×10^{-02}	3.83×10^{-03}	1.39×10^{-03}	9.11×10^{-03}	6.60×10^{-02}
STYRENE	5.15×10^{-02}	3.82×10^{-03}	1.38×10^{-03}	9.08×10^{-03}	6.58×10^{-02}
SUBSTITUTED C9 ESTER (C12)	3.95×10^{-03}	2.93×10^{-04}	1.06×10^{-04}	6.96×10^{-04}	5.05×10^{-03}
SULFUR DIOXIDE	3.18×10^{-01}	2.36×10^{-02}	8.54×10^{-03}	5.61×10^{-02}	4.07×10^{-01}
T-3-HEXENE	6.08×10^{-02}	4.50×10^{-03}	1.63×10^{-03}	1.07×10^{-02}	7.76×10^{-02}
TERT-BUTYL ALCOHOL	1.84×10^{-02}	1.37×10^{-03}	4.95×10^{-04}	3.25×10^{-03}	2.36×10^{-02}
TETRACHLOROETHYLENE	3.07×10^{-02}	2.28×10^{-03}	8.24×10^{-04}	5.42×10^{-03}	3.93×10^{-02}
TETRAFLUOROMETHANE	1.32×10^{-03}	9.76×10^{-05}	3.53×10^{-05}	2.32×10^{-04}	1.68×10^{-03}
TOLUENE	3.95	2.93×10^{-01}	1.06×10^{-01}	6.96×10^{-01}	5.04
TOLUENE DIISOCYANATE	2.90×10^{-02}	2.15×10^{-03}	7.77×10^{-04}	5.11×10^{-03}	3.70×10^{-02}
TOTAL AROMATIC AMINES	1.76×10^{-03}	1.30×10^{-04}	4.71×10^{-05}	3.10×10^{-04}	2.24×10^{-03}
TOTAL C2-C5 ALDEHYDES	5.27×10^{-03}	3.90×10^{-04}	1.41×10^{-04}	9.29×10^{-04}	6.73×10^{-03}
TOTAL SUSPENDED PARTICULATES	2.11	1.57×10^{-01}	5.67×10^{-02}	3.73×10^{-01}	2.70
TOTAL VOCS	$4.15 \times 10^{+01}$	3.07	1.11	7.31	$5.29 \times 10^{+01}$
TRANS-2-BUTENE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
TRANS-2-PENTENE	1.03×10^{-01}	7.66×10^{-03}	2.77×10^{-03}	1.82×10^{-02}	1.32×10^{-01}
TRICHLOROBENZENES	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}
TRICHLOROETHYLENE	1.89×10^{-02}	1.40×10^{-03}	5.06×10^{-04}	3.33×10^{-03}	2.41×10^{-02}
TRICHLOROFLUOROMETHANE	2.68×10^{-02}	1.98×10^{-03}	7.18×10^{-04}	4.72×10^{-03}	3.42×10^{-02}
TRICHLOROTRIFLUOROETHANE	1.76×10^{-02}	1.30×10^{-03}	4.71×10^{-04}	3.10×10^{-03}	2.24×10^{-02}
TRIFLUOROMETHANE	1.32×10^{-02}	9.76×10^{-04}	3.53×10^{-04}	2.32×10^{-03}	1.68×10^{-02}
TRIMETHYLBENZENE	4.83×10^{-03}	3.58×10^{-04}	1.30×10^{-04}	8.51×10^{-04}	6.17×10^{-03}
TRIMETHYLCYCLOHEXANES	8.78×10^{-04}	6.50×10^{-05}	2.36×10^{-05}	1.55×10^{-04}	1.12×10^{-03}
TRIMETHYLCYCLOPENTANE	4.39×10^{-04}	3.25×10^{-05}	1.18×10^{-05}	7.74×10^{-05}	5.61×10^{-04}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
TRIMETHYLDECENE	8.78×10^{-04}	6.50×10^{-05}	2.36×10^{-05}	1.55×10^{-04}	1.12×10^{-03}
TRIMETHYLFLUOROSILANE	3.03×10^{-02}	2.24×10^{-03}	8.13×10^{-04}	5.34×10^{-03}	3.87×10^{-02}
TRIMETHYLHEPTANES	8.78×10^{-04}	6.50×10^{-05}	2.36×10^{-05}	1.55×10^{-04}	1.12×10^{-03}
VINYL ACETATE	2.41×10^{-02}	1.79×10^{-03}	6.48×10^{-04}	4.26×10^{-03}	3.08×10^{-02}
VINYL CHLORIDE	1.84×10^{-02}	1.37×10^{-03}	4.95×10^{-04}	3.25×10^{-03}	2.36×10^{-02}
ZINC AND COMPOUNDS	1.02×10^{-02}	7.59×10^{-04}	2.75×10^{-04}	1.80×10^{-03}	1.31×10^{-02}

Table C1.15: Annual Emissions from Construction Off-Road Vehicles and Equipment – CNG and LPG

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
1,2,3-TRIMETHYLBENZENE	4.87×10^{-04}	3.61×10^{-05}	1.31×10^{-05}	8.58×10^{-05}	6.22×10^{-04}
1,2,4-TRIMETHYLBENZENE	4.87×10^{-04}	3.61×10^{-05}	1.31×10^{-05}	8.58×10^{-05}	6.22×10^{-04}
1,3,5-TRIMETHYLBENZENE	9.74×10^{-04}	7.21×10^{-05}	2.61×10^{-05}	1.72×10^{-04}	1.24×10^{-03}
1,3-BUTADIENE	6.02×10^{-05}	4.46×10^{-06}	1.62×10^{-06}	1.06×10^{-05}	7.69×10^{-05}
1-NONENE	4.87×10^{-04}	3.61×10^{-05}	1.31×10^{-05}	8.58×10^{-05}	6.22×10^{-04}
1-PENTENE	4.87×10^{-04}	3.61×10^{-05}	1.31×10^{-05}	8.58×10^{-05}	6.22×10^{-04}
2,2-DIMETHYLBUTANE	4.87×10^{-04}	3.61×10^{-05}	1.31×10^{-05}	8.58×10^{-05}	6.22×10^{-04}
2,4-DIMETHYLPENTANE	4.87×10^{-04}	3.61×10^{-05}	1.31×10^{-05}	8.58×10^{-05}	6.22×10^{-04}
2-METHYL-1-PENTENE	9.74×10^{-04}	7.21×10^{-05}	2.61×10^{-05}	1.72×10^{-04}	1.24×10^{-03}
2-METHYL-2-BUTENE	4.87×10^{-04}	3.61×10^{-05}	1.31×10^{-05}	8.58×10^{-05}	6.22×10^{-04}
3-METHYLHEPTANE	9.74×10^{-04}	7.21×10^{-05}	2.61×10^{-05}	1.72×10^{-04}	1.24×10^{-03}
3-METHYLHEXANE	4.87×10^{-04}	3.61×10^{-05}	1.31×10^{-05}	8.58×10^{-05}	6.22×10^{-04}
3-METHYLPENTANE	9.74×10^{-04}	7.21×10^{-05}	2.61×10^{-05}	1.72×10^{-04}	1.24×10^{-03}
ACETALDEHYDE	6.71×10^{-04}	4.97×10^{-05}	1.80×10^{-05}	1.18×10^{-04}	8.57×10^{-04}
ACETYLENE	1.56×10^{-02}	1.15×10^{-03}	4.18×10^{-04}	2.75×10^{-03}	1.99×10^{-02}
BENZENE	1.03×10^{-05}	7.62×10^{-07}	2.76×10^{-07}	1.81×10^{-06}	1.31×10^{-05}
C10 AROMATIC	4.87×10^{-04}	3.61×10^{-05}	1.31×10^{-05}	8.58×10^{-05}	6.22×10^{-04}
C10 OLEFINS	9.74×10^{-04}	7.21×10^{-05}	2.61×10^{-05}	1.72×10^{-04}	1.24×10^{-03}
C3/C4/C5 ALKYLBENZENES	4.87×10^{-04}	3.61×10^{-05}	1.31×10^{-05}	8.58×10^{-05}	6.22×10^{-04}
C9 OLEFINS	1.95×10^{-03}	1.44×10^{-04}	5.22×10^{-05}	3.43×10^{-04}	2.49×10^{-03}
CARBON MONOXIDE	$2.16 \times 10^{+01}$	1.60	5.78×10^{-01}	3.80	$2.75 \times 10^{+01}$
CHROMIUM (III) COMPOUNDS	1.39×10^{-04}	1.03×10^{-05}	3.72×10^{-06}	2.44×10^{-05}	1.77×10^{-04}
CHROMIUM (VI) COMPOUNDS	1.39×10^{-04}	1.03×10^{-05}	3.72×10^{-06}	2.44×10^{-05}	1.77×10^{-04}
CIS-2-BUTENE	9.74×10^{-04}	7.21×10^{-05}	2.61×10^{-05}	1.72×10^{-04}	1.24×10^{-03}
COBALT AND COMPOUNDS	5.04×10^{-04}	3.74×10^{-05}	1.35×10^{-05}	8.89×10^{-05}	6.44×10^{-04}
COPPER AND COMPOUNDS	1.26×10^{-05}	9.34×10^{-07}	3.38×10^{-07}	2.22×10^{-06}	1.61×10^{-05}
CYCLOHEXANE	4.87×10^{-04}	3.61×10^{-05}	1.31×10^{-05}	8.58×10^{-05}	6.22×10^{-04}
CYCLOPENTANE	9.74×10^{-04}	7.21×10^{-05}	2.61×10^{-05}	1.72×10^{-04}	1.24×10^{-03}
ETHANE	6.82×10^{-01}	5.05×10^{-02}	1.83×10^{-02}	1.20×10^{-01}	8.71×10^{-01}
ETHYLBENZENE	4.87×10^{-04}	3.61×10^{-05}	1.31×10^{-05}	8.58×10^{-05}	6.22×10^{-04}
ETHYLENE	3.07×10^{-02}	2.27×10^{-03}	8.23×10^{-04}	5.41×10^{-03}	3.92×10^{-02}
FORMALDEHYDE	1.94×10^{-03}	1.44×10^{-04}	5.21×10^{-05}	3.42×10^{-04}	2.48×10^{-03}
HEPTENE	4.87×10^{-04}	3.61×10^{-05}	1.31×10^{-05}	8.58×10^{-05}	6.22×10^{-04}
ISOBUTANE	2.09×10^{-02}	1.55×10^{-03}	5.61×10^{-04}	3.69×10^{-03}	2.67×10^{-02}
ISOBUTYLENE	9.74×10^{-04}	7.21×10^{-05}	2.61×10^{-05}	1.72×10^{-04}	1.24×10^{-03}
ISOBUTYRALDEHYDE	9.74×10^{-04}	7.21×10^{-05}	2.61×10^{-05}	1.72×10^{-04}	1.24×10^{-03}
ISOMERS OF BUTENE	1.27×10^{-02}	9.38×10^{-04}	3.40×10^{-04}	2.23×10^{-03}	1.62×10^{-02}
ISOMERS OF DECANE	9.74×10^{-04}	7.21×10^{-05}	2.61×10^{-05}	1.72×10^{-04}	1.24×10^{-03}
ISOMERS OF HEPTANE	1.95×10^{-03}	1.44×10^{-04}	5.22×10^{-05}	3.43×10^{-04}	2.49×10^{-03}
ISOMERS OF HEXANE	9.74×10^{-04}	7.21×10^{-05}	2.61×10^{-05}	1.72×10^{-04}	1.24×10^{-03}
ISOMERS OF NONANE	4.87×10^{-04}	3.61×10^{-05}	1.31×10^{-05}	8.58×10^{-05}	6.22×10^{-04}
ISOMERS OF OCTANE	9.74×10^{-04}	7.21×10^{-05}	2.61×10^{-05}	1.72×10^{-04}	1.24×10^{-03}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
ISOMERS OF PENTANE	6.33×10^{-03}	4.69×10^{-04}	1.70×10^{-04}	1.12×10^{-03}	8.08×10^{-03}
ISOMERS OF XYLENE	9.74×10^{-04}	7.21×10^{-05}	2.61×10^{-05}	1.72×10^{-04}	1.24×10^{-03}
LEAD AND COMPOUNDS	1.26×10^{-05}	9.34×10^{-07}	3.38×10^{-07}	2.22×10^{-06}	1.61×10^{-05}
MANGANESE AND COMPOUNDS	1.26×10^{-05}	9.34×10^{-07}	3.38×10^{-07}	2.22×10^{-06}	1.61×10^{-05}
METHANE	3.73	2.77×10^{-01}	1.00×10^{-01}	6.58×10^{-01}	4.77
METHYLCYCLOHEXANE	9.74×10^{-04}	7.21×10^{-05}	2.61×10^{-05}	1.72×10^{-04}	1.24×10^{-03}
METHYLCYCLOPENTANE	1.95×10^{-03}	1.44×10^{-04}	5.22×10^{-05}	3.43×10^{-04}	2.49×10^{-03}
M-ETHYLTOLUENE	4.87×10^{-04}	3.61×10^{-05}	1.31×10^{-05}	8.58×10^{-05}	6.22×10^{-04}
M-XYLENE	4.87×10^{-04}	3.61×10^{-05}	1.31×10^{-05}	8.58×10^{-05}	6.22×10^{-04}
N-BUTANE	4.87×10^{-02}	3.61×10^{-03}	1.31×10^{-03}	8.58×10^{-03}	6.22×10^{-02}
N-DECANE	4.87×10^{-04}	3.61×10^{-05}	1.31×10^{-05}	8.58×10^{-05}	6.22×10^{-04}
N-HEPTANE	9.74×10^{-04}	7.21×10^{-05}	2.61×10^{-05}	1.72×10^{-04}	1.24×10^{-03}
N-HEXANE	9.74×10^{-04}	7.21×10^{-05}	2.61×10^{-05}	1.72×10^{-04}	1.24×10^{-03}
NICKEL AND COMPOUNDS	1.39×10^{-04}	1.03×10^{-05}	3.72×10^{-06}	2.44×10^{-05}	1.77×10^{-04}
NITRIC OXIDE	3.32	2.46×10^{-01}	8.91×10^{-02}	5.85×10^{-01}	4.24
NITROGEN DIOXIDE	2.68×10^{-01}	1.99×10^{-02}	7.19×10^{-03}	4.72×10^{-02}	3.42×10^{-01}
N-NONANE	4.87×10^{-04}	3.61×10^{-05}	1.31×10^{-05}	8.58×10^{-05}	6.22×10^{-04}
N-OCTANE	9.74×10^{-04}	7.21×10^{-05}	2.61×10^{-05}	1.72×10^{-04}	1.24×10^{-03}
N-PENTANE	6.33×10^{-03}	4.69×10^{-04}	1.70×10^{-04}	1.12×10^{-03}	8.08×10^{-03}
N-UNDECANE	4.87×10^{-04}	3.61×10^{-05}	1.31×10^{-05}	8.58×10^{-05}	6.22×10^{-04}
OCTENE	4.87×10^{-04}	3.61×10^{-05}	1.31×10^{-05}	8.58×10^{-05}	6.22×10^{-04}
O-ETHYLTOLUENE	4.87×10^{-04}	3.61×10^{-05}	1.31×10^{-05}	8.58×10^{-05}	6.22×10^{-04}
OXIDES OF NITROGEN	5.36	3.97×10^{-01}	1.44×10^{-01}	9.45×10^{-01}	6.85
O-XYLENE	4.87×10^{-04}	3.61×10^{-05}	1.31×10^{-05}	8.58×10^{-05}	6.22×10^{-04}
PARTICULATE MATTER < 10 µm	2.52×10^{-02}	1.87×10^{-03}	6.76×10^{-04}	4.44×10^{-03}	3.22×10^{-02}
PARTICULATE MATTER < 2.5 µm	2.52×10^{-02}	1.87×10^{-03}	6.76×10^{-04}	4.44×10^{-03}	3.22×10^{-02}
PROPANE	1.42×10^{-01}	1.05×10^{-02}	3.80×10^{-03}	2.50×10^{-02}	1.81×10^{-01}
PROPYLENE	8.23×10^{-02}	6.09×10^{-03}	2.21×10^{-03}	1.45×10^{-02}	1.05×10^{-01}
SULFUR DIOXIDE	5.81×10^{-03}	4.31×10^{-04}	1.56×10^{-04}	1.02×10^{-03}	7.43×10^{-03}
TOLUENE	1.95×10^{-03}	1.44×10^{-04}	5.22×10^{-05}	3.43×10^{-04}	2.49×10^{-03}
TOTAL SUSPENDED PARTICULATES	2.65×10^{-02}	1.97×10^{-03}	7.12×10^{-04}	4.68×10^{-03}	3.39×10^{-02}
TOTAL VOCS	1.09	8.08×10^{-02}	2.93×10^{-02}	1.92×10^{-01}	1.39
TRANS-2-BUTENE	6.33×10^{-03}	4.69×10^{-04}	1.70×10^{-04}	1.12×10^{-03}	8.08×10^{-03}
TRANS-2-PENTENE	4.87×10^{-04}	3.61×10^{-05}	1.31×10^{-05}	8.58×10^{-05}	6.22×10^{-04}
ZINC AND COMPOUNDS	1.39×10^{-04}	1.03×10^{-05}	3.72×10^{-06}	2.44×10^{-05}	1.77×10^{-04}

Table C1.16: Annual Emissions from Construction Off-Road Vehicles and Equipment – Diesel

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
1,2,4-TRIMETHYLBENZENE	6.12×10^{-02}	4.53×10^{-03}	1.64×10^{-03}	1.08×10^{-02}	7.81×10^{-02}
1,3,5-TRIMETHYLBENZENE	1.81×10^{-02}	1.34×10^{-03}	4.85×10^{-04}	3.19×10^{-03}	2.31×10^{-02}
1,3-BUTADIENE	2.15×10^{-02}	1.60×10^{-03}	5.78×10^{-04}	3.80×10^{-03}	2.75×10^{-02}
1-METHYL-3-ETHYLBENZENE	1.46×10^{-02}	1.08×10^{-03}	3.91×10^{-04}	2.57×10^{-03}	1.86×10^{-02}
1-METHYL-4-ETHYLBENZENE	3.61×10^{-02}	2.68×10^{-03}	9.69×10^{-04}	6.37×10^{-03}	4.61×10^{-02}
1-METHYLNAPHTHALENE	2.63×10^{-02}	1.95×10^{-03}	7.04×10^{-04}	4.63×10^{-03}	3.35×10^{-02}
1-METHYLPHENANTHRENE	1.18×10^{-03}	8.75×10^{-05}	3.17×10^{-05}	2.08×10^{-04}	1.51×10^{-03}
2,2,4-TRIMETHYLPENTANE	8.62×10^{-02}	6.38×10^{-03}	2.31×10^{-03}	1.52×10^{-02}	1.10×10^{-01}
2,2-DIMETHYLBUTANE	2.15×10^{-02}	1.60×10^{-03}	5.78×10^{-04}	3.80×10^{-03}	2.75×10^{-02}
2,3,4-TRIMETHYLPENTANE	2.15×10^{-02}	1.60×10^{-03}	5.78×10^{-04}	3.80×10^{-03}	2.75×10^{-02}
2,3-DIMETHYLBUTANE	3.96×10^{-02}	2.93×10^{-03}	1.06×10^{-03}	6.98×10^{-03}	5.06×10^{-02}
2,3-DIMETHYLHEXANE	1.11×10^{-02}	8.24×10^{-04}	2.98×10^{-04}	1.96×10^{-03}	1.42×10^{-02}
2,3-DIMETHYLPENTANE	5.00×10^{-02}	3.71×10^{-03}	1.34×10^{-03}	8.82×10^{-03}	6.39×10^{-02}
2,4-DIMETHYLHEXANE	3.48×10^{-03}	2.58×10^{-04}	9.34×10^{-05}	6.13×10^{-04}	4.45×10^{-03}
2,4-DIMETHYLPENTANE	2.85×10^{-02}	2.11×10^{-03}	7.64×10^{-04}	5.02×10^{-03}	3.64×10^{-02}
2,5-DIMETHYLHEXANE	3.48×10^{-03}	2.58×10^{-04}	9.34×10^{-05}	6.13×10^{-04}	4.45×10^{-03}
2-METHYL-1-BUTENE	1.81×10^{-02}	1.34×10^{-03}	4.85×10^{-04}	3.19×10^{-03}	2.31×10^{-02}
2-METHYL-2-PENTENE	1.46×10^{-02}	1.08×10^{-03}	3.91×10^{-04}	2.57×10^{-03}	1.86×10^{-02}
2-METHYL-2-PROPENAL	2.78×10^{-01}	2.06×10^{-02}	7.46×10^{-03}	4.90×10^{-02}	3.55×10^{-01}
2-METHYLANTHRACENE	7.19×10^{-04}	5.33×10^{-05}	1.93×10^{-05}	1.27×10^{-04}	9.19×10^{-04}
2-METHYLCHOLANTHRENE	5.00×10^{-03}	3.70×10^{-04}	1.34×10^{-04}	8.81×10^{-04}	6.38×10^{-03}
2-METHYLHEPTANE	6.95×10^{-03}	5.15×10^{-04}	1.86×10^{-04}	1.22×10^{-03}	8.87×10^{-03}
2-METHYLHEXANE	3.96×10^{-02}	2.93×10^{-03}	1.06×10^{-03}	6.98×10^{-03}	5.06×10^{-02}
2-METHYLNAPHTHALENE	4.25×10^{-02}	3.15×10^{-03}	1.14×10^{-03}	7.48×10^{-03}	5.42×10^{-02}
2-METHYLPENTANE	6.46×10^{-02}	4.79×10^{-03}	1.73×10^{-03}	1.14×10^{-02}	8.25×10^{-02}
3-ETHYLHEXANE	1.46×10^{-02}	1.08×10^{-03}	3.91×10^{-04}	2.57×10^{-03}	1.86×10^{-02}
3-METHYL-1-BUTENE	1.11×10^{-02}	8.24×10^{-04}	2.98×10^{-04}	1.96×10^{-03}	1.42×10^{-02}
3-METHYLHEXANE	2.15×10^{-02}	1.60×10^{-03}	5.78×10^{-04}	3.80×10^{-03}	2.75×10^{-02}
3-METHYLPENTANE	4.66×10^{-02}	3.45×10^{-03}	1.25×10^{-03}	8.21×10^{-03}	5.95×10^{-02}
3-METHYLPHENANTHRENE	2.11×10^{-03}	1.56×10^{-04}	5.65×10^{-05}	3.71×10^{-04}	2.69×10^{-03}
9-METHYLPHENANTHRENE	1.59×10^{-03}	1.18×10^{-04}	4.27×10^{-05}	2.81×10^{-04}	2.03×10^{-03}
ACENAPHTHENE	1.17×10^{-02}	8.65×10^{-04}	3.13×10^{-04}	2.06×10^{-03}	1.49×10^{-02}
ACENAPHTHYLENE	9.80×10^{-03}	7.26×10^{-04}	2.63×10^{-04}	1.73×10^{-03}	1.25×10^{-02}
ACETALDEHYDE	2.90	2.15×10^{-01}	7.79×10^{-02}	5.12×10^{-01}	3.71
ACETOPHENONE	3.54×10^{-01}	2.63×10^{-02}	9.51×10^{-03}	6.25×10^{-02}	4.53×10^{-01}
ACETYLENE	3.20×10^{-01}	2.37×10^{-02}	8.57×10^{-03}	5.63×10^{-02}	4.08×10^{-01}
ACROLEIN	2.36×10^{-01}	1.75×10^{-02}	6.34×10^{-03}	4.16×10^{-02}	3.02×10^{-01}
ANTHRACENE	1.84×10^{-03}	1.37×10^{-04}	4.95×10^{-05}	3.25×10^{-04}	2.36×10^{-03}
BENZALDEHYDE	2.64×10^{-01}	1.96×10^{-02}	7.08×10^{-03}	4.65×10^{-02}	3.37×10^{-01}
BENZENE	1.90×10^{-01}	1.41×10^{-02}	5.11×10^{-03}	3.36×10^{-02}	2.43×10^{-01}
BENZO(A)ANTHRACENE	2.28×10^{-03}	1.69×10^{-04}	6.12×10^{-05}	4.02×10^{-04}	2.91×10^{-03}
BENZO(A)PYRENE	1.86×10^{-03}	1.38×10^{-04}	4.98×10^{-05}	3.27×10^{-04}	2.37×10^{-03}
BENZO(B)FLUORANTHENE	1.03×10^{-03}	7.64×10^{-05}	2.76×10^{-05}	1.82×10^{-04}	1.32×10^{-03}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
BENZO(E)PYRENE	1.10×10^{-03}	8.12×10^{-05}	2.94×10^{-05}	1.93×10^{-04}	1.40×10^{-03}
BENZO(G,H,I)FLUORANTHENE	3.98×10^{-04}	2.95×10^{-05}	1.07×10^{-05}	7.02×10^{-05}	5.09×10^{-04}
BENZO(G,H,I,)PERYLENE	7.71×10^{-04}	5.71×10^{-05}	2.07×10^{-05}	1.36×10^{-04}	9.85×10^{-04}
BENZO(K)FLUORANTHENE	9.93×10^{-04}	7.36×10^{-05}	2.66×10^{-05}	1.75×10^{-04}	1.27×10^{-03}
BUTYRALDEHYDE	9.03×10^{-02}	6.69×10^{-03}	2.42×10^{-03}	1.59×10^{-02}	1.15×10^{-01}
CADMIUM AND COMPOUNDS	6.81×10^{-03}	5.04×10^{-04}	1.83×10^{-04}	1.20×10^{-03}	8.70×10^{-03}
CARBON MONOXIDE	$5.83 \times 10^{+01}$	4.32	1.56	$1.03 \times 10^{+01}$	$7.45 \times 10^{+01}$
CHROMIUM (III) COMPOUNDS	7.95×10^{-04}	5.89×10^{-05}	2.13×10^{-05}	1.40×10^{-04}	1.01×10^{-03}
CHROMIUM (VI) COMPOUNDS	3.41×10^{-04}	2.52×10^{-05}	9.13×10^{-06}	6.00×10^{-05}	4.35×10^{-04}
CHRYSENE	1.24×10^{-03}	9.19×10^{-05}	3.33×10^{-05}	2.19×10^{-04}	1.58×10^{-03}
CIS-2-BUTENE	1.81×10^{-02}	1.34×10^{-03}	4.85×10^{-04}	3.19×10^{-03}	2.31×10^{-02}
CIS-2-HEXENE	6.95×10^{-03}	5.15×10^{-04}	1.86×10^{-04}	1.22×10^{-03}	8.87×10^{-03}
COBALT AND COMPOUNDS	1.14×10^{-03}	8.41×10^{-05}	3.04×10^{-05}	2.00×10^{-04}	1.45×10^{-03}
COPPER AND COMPOUNDS	1.14×10^{-03}	8.41×10^{-05}	3.04×10^{-05}	2.00×10^{-04}	1.45×10^{-03}
CORONENE	5.15×10^{-05}	3.81×10^{-06}	1.38×10^{-06}	9.07×10^{-06}	6.57×10^{-05}
CROTONALDEHYDE	9.31×10^{-01}	6.90×10^{-02}	2.50×10^{-02}	1.64×10^{-01}	1.19
CYCLOHEXANE	1.46×10^{-02}	1.08×10^{-03}	3.91×10^{-04}	2.57×10^{-03}	1.86×10^{-02}
CYCLOPENTA(C,D)PYRENE	1.70×10^{-03}	1.26×10^{-04}	4.55×10^{-05}	2.99×10^{-04}	2.17×10^{-03}
CYCLOPENTANE	2.85×10^{-02}	2.11×10^{-03}	7.64×10^{-04}	5.02×10^{-03}	3.64×10^{-02}
CYCLOPENTENE	1.46×10^{-02}	1.08×10^{-03}	3.91×10^{-04}	2.57×10^{-03}	1.86×10^{-02}
DECANOIC ACID	5.06×10^{-03}	3.75×10^{-04}	1.36×10^{-04}	8.92×10^{-04}	6.46×10^{-03}
DECYLCYCLOHEXANE	2.66×10^{-03}	1.97×10^{-04}	7.13×10^{-05}	4.69×10^{-04}	3.40×10^{-03}
DIACETYL	6.26×10^{-02}	4.63×10^{-03}	1.68×10^{-03}	1.10×10^{-02}	7.99×10^{-02}
DIBENZO(A,H)ANTHRACENE	1.00×10^{-03}	7.40×10^{-05}	2.68×10^{-05}	1.76×10^{-04}	1.28×10^{-03}
DIBENZOFURAN	1.99×10^{-03}	1.47×10^{-04}	5.34×10^{-05}	3.51×10^{-04}	2.54×10^{-03}
EICOSANE	1.43×10^{-02}	1.06×10^{-03}	3.84×10^{-04}	2.52×10^{-03}	1.83×10^{-02}
ETHYLBENZENE	3.27×10^{-02}	2.42×10^{-03}	8.76×10^{-04}	5.76×10^{-03}	4.17×10^{-02}
ETHYLENE	5.95×10^{-01}	4.41×10^{-02}	1.60×10^{-02}	1.05×10^{-01}	7.60×10^{-01}
FLUORANTHENE	8.79×10^{-04}	6.51×10^{-05}	2.36×10^{-05}	1.55×10^{-04}	1.12×10^{-03}
FLUORENE	7.36×10^{-03}	5.45×10^{-04}	1.97×10^{-04}	1.30×10^{-03}	9.40×10^{-03}
FORMALDEHYDE	1.55	1.15×10^{-01}	4.16×10^{-02}	2.73×10^{-01}	1.98
GLYOXAL	1.46×10^{-01}	1.08×10^{-02}	3.91×10^{-03}	2.57×10^{-02}	1.86×10^{-01}
HEPTADECANE	4.27×10^{-02}	3.16×10^{-03}	1.14×10^{-03}	7.52×10^{-03}	5.45×10^{-02}
HEPTANAL	2.22×10^{-01}	1.65×10^{-02}	5.96×10^{-03}	3.92×10^{-02}	2.84×10^{-01}
HEPTYLCYCLOHEXANE	1.39×10^{-03}	1.03×10^{-04}	3.72×10^{-05}	2.44×10^{-04}	1.77×10^{-03}
HEXADECANE	4.94×10^{-02}	3.66×10^{-03}	1.33×10^{-03}	8.71×10^{-03}	6.31×10^{-02}
HEXALDEHYDE	1.53×10^{-01}	1.13×10^{-02}	4.10×10^{-03}	2.69×10^{-02}	1.95×10^{-01}
HEXYLCYCLOHEXANE	1.04×10^{-03}	7.71×10^{-05}	2.79×10^{-05}	1.83×10^{-04}	1.33×10^{-03}
INDENO(1,2,3-C,D)PYRENE	1.44×10^{-03}	1.07×10^{-04}	3.87×10^{-05}	2.54×10^{-04}	1.84×10^{-03}
ISOBUTYLENE	7.92×10^{-02}	5.87×10^{-03}	2.12×10^{-03}	1.40×10^{-02}	1.01×10^{-01}
ISOMERS OF XYLENE	2.20×10^{-01}	1.63×10^{-02}	5.89×10^{-03}	3.87×10^{-02}	2.80×10^{-01}
ISOPENTANE	1.90×10^{-01}	1.41×10^{-02}	5.11×10^{-03}	3.36×10^{-02}	2.43×10^{-01}
LAURIC ACID	4.07×10^{-03}	3.02×10^{-04}	1.09×10^{-04}	7.18×10^{-04}	5.20×10^{-03}
LEAD AND COMPOUNDS	1.14×10^{-03}	8.41×10^{-05}	3.04×10^{-05}	2.00×10^{-04}	1.45×10^{-03}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
M & P-XYLENE	1.62×10^{-01}	1.20×10^{-02}	4.34×10^{-03}	2.85×10^{-02}	2.07×10^{-01}
MANGANESE AND COMPOUNDS	1.14×10^{-03}	8.41×10^{-05}	3.04×10^{-05}	2.00×10^{-04}	1.45×10^{-03}
METHYL ETHYL KETONE	5.21×10^{-01}	3.86×10^{-02}	1.40×10^{-02}	9.19×10^{-02}	6.66×10^{-01}
METHYLCYCLOHEXANE	3.61×10^{-02}	2.68×10^{-03}	9.69×10^{-04}	6.37×10^{-03}	4.61×10^{-02}
METHYLCYCLOPENTANE	4.31×10^{-02}	3.19×10^{-03}	1.16×10^{-03}	7.60×10^{-03}	5.50×10^{-02}
METHYLGLYOXAL	1.18×10^{-01}	8.75×10^{-03}	3.17×10^{-03}	2.08×10^{-02}	1.51×10^{-01}
MYRISTIC ACID	3.72×10^{-04}	2.76×10^{-05}	9.99×10^{-06}	6.57×10^{-05}	4.76×10^{-04}
NAPHTHALENE	5.49×10^{-02}	4.06×10^{-03}	1.47×10^{-03}	9.67×10^{-03}	7.01×10^{-02}
N-BUTANE	2.66×10^{-01}	1.97×10^{-02}	7.14×10^{-03}	4.69×10^{-02}	3.40×10^{-01}
N-DODECANE	3.50×10^{-02}	2.59×10^{-03}	9.38×10^{-04}	6.16×10^{-03}	4.47×10^{-02}
N-HENEICOSANE	4.57×10^{-03}	3.39×10^{-04}	1.23×10^{-04}	8.06×10^{-04}	5.84×10^{-03}
N-HEPTANE	3.27×10^{-02}	2.42×10^{-03}	8.76×10^{-04}	5.76×10^{-03}	4.17×10^{-02}
NITRIC OXIDE	$9.50 \times 10^{+01}$	7.04	2.55	$1.67 \times 10^{+01}$	$1.21 \times 10^{+02}$
NITROGEN DIOXIDE	7.67	5.68×10^{-01}	2.06×10^{-01}	1.35	9.79
N-NONANE	1.11×10^{-02}	8.24×10^{-04}	2.98×10^{-04}	1.96×10^{-03}	1.42×10^{-02}
N-NONYLCYCLOHEXANE	1.72×10^{-03}	1.27×10^{-04}	4.62×10^{-05}	3.03×10^{-04}	2.20×10^{-03}
N-OCTANE	1.81×10^{-02}	1.34×10^{-03}	4.85×10^{-04}	3.19×10^{-03}	2.31×10^{-02}
NONADECANE	2.86×10^{-02}	2.12×10^{-03}	7.66×10^{-04}	5.03×10^{-03}	3.65×10^{-02}
NONANOIC ACID	1.67×10^{-02}	1.24×10^{-03}	4.47×10^{-04}	2.94×10^{-03}	2.13×10^{-02}
N-PENTANE	1.29×10^{-01}	9.58×10^{-03}	3.47×10^{-03}	2.28×10^{-02}	1.65×10^{-01}
N-PROPYLBENZENE	6.95×10^{-03}	5.15×10^{-04}	1.86×10^{-04}	1.22×10^{-03}	8.87×10^{-03}
N-TRIDECANE	3.32×10^{-02}	2.46×10^{-03}	8.89×10^{-04}	5.84×10^{-03}	4.23×10^{-02}
OCTADECANE	4.18×10^{-02}	3.09×10^{-03}	1.12×10^{-03}	7.36×10^{-03}	5.33×10^{-02}
OCTANAL	2.15×10^{-01}	1.60×10^{-02}	5.78×10^{-03}	3.80×10^{-02}	2.75×10^{-01}
OCTANOIC ACID	8.68×10^{-03}	6.43×10^{-04}	2.33×10^{-04}	1.53×10^{-03}	1.11×10^{-02}
OCTYLCYCLOHEXANE	1.82×10^{-03}	1.35×10^{-04}	4.89×10^{-05}	3.21×10^{-04}	2.33×10^{-03}
OXIDES OF NITROGEN	$1.53 \times 10^{+02}$	$1.14 \times 10^{+01}$	4.11	$2.70 \times 10^{+01}$	$1.96 \times 10^{+02}$
O-XYLENE	5.77×10^{-02}	4.27×10^{-03}	1.55×10^{-03}	1.02×10^{-02}	7.37×10^{-02}
PARTICULATE MATTER < 10 µm	$1.14 \times 10^{+01}$	8.41×10^{-01}	3.04×10^{-01}	2.00	$1.45 \times 10^{+01}$
PARTICULATE MATTER < 2.5 µm	$1.10 \times 10^{+01}$	8.16×10^{-01}	2.95×10^{-01}	1.94	$1.41 \times 10^{+01}$
PENTADECANE	2.77×10^{-02}	2.05×10^{-03}	7.42×10^{-04}	4.87×10^{-03}	3.53×10^{-02}
PENTYLCYCLOHEXANE	5.83×10^{-03}	4.32×10^{-04}	1.56×10^{-04}	1.03×10^{-03}	7.45×10^{-03}
PHENANTHRENE	6.23×10^{-03}	4.62×10^{-04}	1.67×10^{-04}	1.10×10^{-03}	7.96×10^{-03}
POLYCHLORINATED DIOXINS AND FURANS	2.67×10^{-08}	1.97×10^{-09}	7.15×10^{-10}	4.70×10^{-09}	3.40×10^{-08}
POLYCYCLIC AROMATIC HYDROCARBONS	1.07×10^{-01}	7.94×10^{-03}	2.87×10^{-03}	1.89×10^{-02}	1.37×10^{-01}
PROPIONALDEHYDE	9.73×10^{-01}	7.21×10^{-02}	2.61×10^{-02}	1.71×10^{-01}	1.24
PROPYLENE	5.42×10^{-02}	4.02×10^{-03}	1.45×10^{-03}	9.55×10^{-03}	6.92×10^{-02}
PYRENE	4.83×10^{-04}	3.58×10^{-05}	1.30×10^{-05}	8.52×10^{-05}	6.17×10^{-04}
RETENE	5.36×10^{-04}	3.97×10^{-05}	1.44×10^{-05}	9.45×10^{-05}	6.85×10^{-04}
SULFUR DIOXIDE	4.91	3.63×10^{-01}	1.32×10^{-01}	8.65×10^{-01}	6.27
TETRADECANE	4.37×10^{-02}	3.24×10^{-03}	1.17×10^{-03}	7.70×10^{-03}	5.58×10^{-02}
TOLUENE	2.77×10^{-01}	2.05×10^{-02}	7.42×10^{-03}	4.87×10^{-02}	3.53×10^{-01}
TOTAL SUSPENDED PARTICULATES	$1.19 \times 10^{+01}$	8.85×10^{-01}	3.20×10^{-01}	2.11	$1.53 \times 10^{+01}$
TOTAL VOC	$1.29 \times 10^{+01}$	9.53×10^{-01}	3.45×10^{-01}	2.27	$1.64 \times 10^{+01}$

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
TRANS-2-BUTENE	3.61×10^{-02}	2.68×10^{-03}	9.69×10^{-04}	6.37×10^{-03}	4.61×10^{-02}
TRANS-2-HEXENE	1.11×10^{-02}	8.24×10^{-04}	2.98×10^{-04}	1.96×10^{-03}	1.42×10^{-02}
TRANS-2-PENTENE	3.48×10^{-03}	2.58×10^{-04}	9.34×10^{-05}	6.13×10^{-04}	4.45×10^{-03}
TRIDECANOIC ACID	9.12×10^{-04}	6.76×10^{-05}	2.45×10^{-05}	1.61×10^{-04}	1.16×10^{-03}
UNDECANOIC ACID	1.43×10^{-02}	1.06×10^{-03}	3.84×10^{-04}	2.52×10^{-03}	1.83×10^{-02}
ZINC AND COMPOUNDS	7.95×10^{-03}	5.89×10^{-04}	2.13×10^{-04}	1.40×10^{-03}	1.01×10^{-02}

Table C1.17: Annual Emissions from Industrial Off-Road Vehicles and Equipment – 4-Stroke Petrol

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
1,1,1-TRICHLOROETHANE	1.24×10^{-04}	1.34×10^{-05}	2.01×10^{-05}	4.02×10^{-04}	5.59×10^{-04}
1,1,2-TRICHLOROETHANE	1.01×10^{-04}	1.09×10^{-05}	1.64×10^{-05}	3.27×10^{-04}	4.55×10^{-04}
1,2,3-TRIMETHYLBENZENE	1.62×10^{-03}	1.75×10^{-04}	2.63×10^{-04}	5.24×10^{-03}	7.29×10^{-03}
1,2,4-TRIMETHYLBENZENE	5.80×10^{-03}	6.27×10^{-04}	9.40×10^{-04}	1.87×10^{-02}	2.61×10^{-02}
1,2-DIETHYLBENZENE	1.34×10^{-03}	1.45×10^{-04}	2.17×10^{-04}	4.33×10^{-03}	6.03×10^{-03}
1,3,5-TRIMETHYLBENZENE	4.42×10^{-03}	4.78×10^{-04}	7.16×10^{-04}	1.43×10^{-02}	1.99×10^{-02}
1,3-BUTADIENE	2.49×10^{-03}	2.70×10^{-04}	4.04×10^{-04}	8.07×10^{-03}	1.12×10^{-02}
1,4-BUTANEDIOL	1.16×10^{-05}	1.25×10^{-06}	1.87×10^{-06}	3.74×10^{-05}	5.20×10^{-05}
1-BUTENE	1.16×10^{-04}	1.25×10^{-05}	1.87×10^{-05}	3.74×10^{-04}	5.20×10^{-04}
1-BUTYNE	5.78×10^{-06}	6.24×10^{-07}	9.37×10^{-07}	1.87×10^{-05}	2.60×10^{-05}
1-CHLOROBUTANE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
1-DECENE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
1-HEXENE	4.40×10^{-04}	4.75×10^{-05}	7.13×10^{-05}	1.42×10^{-03}	1.98×10^{-03}
1-METHYL-3-ISOPROPYLBENZENE	1.02×10^{-03}	1.10×10^{-04}	1.65×10^{-04}	3.30×10^{-03}	4.59×10^{-03}
1-METHYL-3-PROPYLBENZENE	7.80×10^{-04}	8.43×10^{-05}	1.26×10^{-04}	2.52×10^{-03}	3.51×10^{-03}
1-PENTENE	3.80×10^{-04}	4.11×10^{-05}	6.16×10^{-05}	1.23×10^{-03}	1.71×10^{-03}
2,2,4-TRIMETHYLPENTANE	5.04×10^{-03}	5.45×10^{-04}	8.18×10^{-04}	1.63×10^{-02}	2.27×10^{-02}
2,2,5-TRIMETHYLHEXANE	9.60×10^{-04}	1.04×10^{-04}	1.56×10^{-04}	3.10×10^{-03}	4.32×10^{-03}
2,2-DICHLORONITROANILINE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
2,2-DIMETHYLBUTANE	1.42×10^{-03}	1.53×10^{-04}	2.30×10^{-04}	4.59×10^{-03}	6.39×10^{-03}
2,2-DIMETHYLHEXANE	1.40×10^{-04}	1.51×10^{-05}	2.27×10^{-05}	4.53×10^{-04}	6.30×10^{-04}
2,3,3-TRIMETHYLPENTANE	2.20×10^{-03}	2.38×10^{-04}	3.57×10^{-04}	7.11×10^{-03}	9.91×10^{-03}
2,3,4-TRIMETHYLPENTANE	2.20×10^{-04}	2.38×10^{-05}	3.57×10^{-05}	7.11×10^{-04}	9.91×10^{-04}
2,3,5-TRIMETHYLHEXANE	2.20×10^{-04}	2.38×10^{-05}	3.57×10^{-05}	7.11×10^{-04}	9.91×10^{-04}
2,3-DIMETHYLBUTANE	1.06×10^{-03}	1.15×10^{-04}	1.72×10^{-04}	3.43×10^{-03}	4.77×10^{-03}
2,3-DIMETHYLPENTANE	2.50×10^{-03}	2.70×10^{-04}	4.05×10^{-04}	8.08×10^{-03}	1.13×10^{-02}
2,4,4-TRIMETHYL-1-PENTENE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
2,4,5-TRIMETHYLHEPTANE	9.00×10^{-04}	9.73×10^{-05}	1.46×10^{-04}	2.91×10^{-03}	4.05×10^{-03}
2,4-DIMETHYLHEPTANE	2.60×10^{-04}	2.81×10^{-05}	4.21×10^{-05}	8.40×10^{-04}	1.17×10^{-03}
2,4-DIMETHYLHEXANE	1.73×10^{-05}	1.87×10^{-06}	2.81×10^{-06}	5.60×10^{-05}	7.80×10^{-05}
2,4-DIMETHYLOCTANE	2.00×10^{-04}	2.16×10^{-05}	3.24×10^{-05}	6.47×10^{-04}	9.00×10^{-04}
2,4-DIMETHYLPENTANE	1.06×10^{-03}	1.15×10^{-04}	1.72×10^{-04}	3.43×10^{-03}	4.77×10^{-03}
2,5-DIMETHYLHEXANE	1.26×10^{-03}	1.36×10^{-04}	2.04×10^{-04}	4.07×10^{-03}	5.67×10^{-03}
2-BUTYNE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
2-FURFURAL	1.07×10^{-04}	1.16×10^{-05}	1.73×10^{-05}	3.46×10^{-04}	4.81×10^{-04}
2-HEXENE	1.60×10^{-04}	1.73×10^{-05}	2.59×10^{-05}	5.17×10^{-04}	7.20×10^{-04}
2-METHYL-1-BUTENE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
2-METHYL-2-BUTENE	1.02×10^{-03}	1.10×10^{-04}	1.65×10^{-04}	3.30×10^{-03}	4.59×10^{-03}
2-METHYL-2-PENTENE	4.60×10^{-04}	4.97×10^{-05}	7.46×10^{-05}	1.49×10^{-03}	2.07×10^{-03}
2-METHYL-3-HEXANONE	2.02×10^{-05}	2.19×10^{-06}	3.28×10^{-06}	6.54×10^{-05}	9.11×10^{-05}
2-METHYLDECANE	2.64×10^{-03}	2.85×10^{-04}	4.28×10^{-04}	8.53×10^{-03}	1.19×10^{-02}
2-METHYLHEPTANE	4.40×10^{-04}	4.75×10^{-05}	7.13×10^{-05}	1.42×10^{-03}	1.98×10^{-03}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
2-METHYLOCTANE	4.00×10^{-05}	4.32×10^{-06}	6.48×10^{-06}	1.29×10^{-04}	1.80×10^{-04}
2-METHYLPENTANE	2.54×10^{-03}	2.74×10^{-04}	4.12×10^{-04}	8.21×10^{-03}	1.14×10^{-02}
3,4-DIMETHYLOCTANE	1.92×10^{-03}	2.07×10^{-04}	3.11×10^{-04}	6.21×10^{-03}	8.64×10^{-03}
3-METHYL-1-BUTENE	3.60×10^{-04}	3.89×10^{-05}	5.84×10^{-05}	1.16×10^{-03}	1.62×10^{-03}
3-METHYLHEPTANE	7.20×10^{-04}	7.78×10^{-05}	1.17×10^{-04}	2.33×10^{-03}	3.24×10^{-03}
3-METHYLHEXANE	1.84×10^{-03}	1.99×10^{-04}	2.98×10^{-04}	5.95×10^{-03}	8.28×10^{-03}
3-METHYLPENTANE	1.72×10^{-03}	1.86×10^{-04}	2.79×10^{-04}	5.56×10^{-03}	7.74×10^{-03}
4-METHYL-1-PENTENE	5.00×10^{-04}	5.40×10^{-05}	8.10×10^{-05}	1.62×10^{-03}	2.25×10^{-03}
4-METHYLANILINE	8.66×10^{-06}	9.37×10^{-07}	1.40×10^{-06}	2.80×10^{-05}	3.90×10^{-05}
4-METHYLHEPTANE	1.04×10^{-03}	1.12×10^{-04}	1.69×10^{-04}	3.36×10^{-03}	4.68×10^{-03}
ACENAPHTHENE	9.66×10^{-06}	1.04×10^{-06}	1.57×10^{-06}	3.12×10^{-05}	4.35×10^{-05}
ACENAPHTHYLENE	2.48×10^{-05}	2.68×10^{-06}	4.02×10^{-06}	8.02×10^{-05}	1.12×10^{-04}
ACETALDEHYDE	1.07×10^{-03}	1.16×10^{-04}	1.74×10^{-04}	3.47×10^{-03}	4.84×10^{-03}
ACETIC ACID	2.11×10^{-04}	2.28×10^{-05}	3.42×10^{-05}	6.82×10^{-04}	9.50×10^{-04}
ACETIC ANHYDRIDE	1.01×10^{-04}	1.09×10^{-05}	1.64×10^{-05}	3.27×10^{-04}	4.55×10^{-04}
ACETONE	4.24×10^{-04}	4.59×10^{-05}	6.88×10^{-05}	1.37×10^{-03}	1.91×10^{-03}
ACETYLENE	4.50×10^{-03}	4.86×10^{-04}	7.29×10^{-04}	1.45×10^{-02}	2.03×10^{-02}
ACROLEIN	1.83×10^{-04}	1.98×10^{-05}	2.97×10^{-05}	5.93×10^{-04}	8.26×10^{-04}
ACRYLIC ACID	1.30×10^{-04}	1.40×10^{-05}	2.11×10^{-05}	4.20×10^{-04}	5.85×10^{-04}
ACRYLONITRILE	1.67×10^{-04}	1.81×10^{-05}	2.72×10^{-05}	5.42×10^{-04}	7.54×10^{-04}
ADIPIC ACID	1.16×10^{-04}	1.25×10^{-05}	1.87×10^{-05}	3.74×10^{-04}	5.20×10^{-04}
ALIPHATICS	2.89×10^{-05}	3.12×10^{-06}	4.68×10^{-06}	9.34×10^{-05}	1.30×10^{-04}
ALKENE KETONE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
ALPHA-PINENE	1.01×10^{-04}	1.09×10^{-05}	1.64×10^{-05}	3.27×10^{-04}	4.55×10^{-04}
ANILINE	2.28×10^{-04}	2.47×10^{-05}	3.70×10^{-05}	7.38×10^{-04}	1.03×10^{-03}
ANTHRACENE	9.91×10^{-06}	1.07×10^{-06}	1.61×10^{-06}	3.20×10^{-05}	4.46×10^{-05}
ANTHRAQUINONE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
BENZALDEHYDE	4.80×10^{-04}	5.19×10^{-05}	7.78×10^{-05}	1.55×10^{-03}	2.16×10^{-03}
BENZENE	1.37×10^{-02}	1.49×10^{-03}	2.23×10^{-03}	4.45×10^{-02}	6.19×10^{-02}
BENZO(A)ANTHRACENE	3.99×10^{-06}	4.31×10^{-07}	6.47×10^{-07}	1.29×10^{-05}	1.80×10^{-05}
BENZO(A)PYRENE	8.55×10^{-06}	9.24×10^{-07}	1.39×10^{-06}	2.76×10^{-05}	3.85×10^{-05}
BENZO(B)FLUORANTHENE	4.47×10^{-06}	4.83×10^{-07}	7.25×10^{-07}	1.45×10^{-05}	2.01×10^{-05}
BENZO(E)PYRENE	3.41×10^{-05}	3.68×10^{-06}	5.52×10^{-06}	1.10×10^{-04}	1.53×10^{-04}
BENZO(G,H,I,)PERYLENE	1.35×10^{-06}	1.46×10^{-07}	2.18×10^{-07}	4.36×10^{-06}	6.07×10^{-06}
BENZO(K)FLUORANTHENE	3.53×10^{-06}	3.81×10^{-07}	5.72×10^{-07}	1.14×10^{-05}	1.59×10^{-05}
BENZOIC ACID	1.16×10^{-05}	1.25×10^{-06}	1.87×10^{-06}	3.74×10^{-05}	5.20×10^{-05}
BENZYL CHLORIDE	1.21×10^{-04}	1.31×10^{-05}	1.97×10^{-05}	3.92×10^{-04}	5.46×10^{-04}
BETA-PINENE	6.64×10^{-05}	7.18×10^{-06}	1.08×10^{-05}	2.15×10^{-04}	2.99×10^{-04}
BIPHENYL	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
B-PHELLANDRENE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
BROMODINITROBENZENE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
BUTOXYBUTENE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
BUTOXYETHOXYETHANOL ACETATE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
BUTYL ACRYLATE	1.24×10^{-04}	1.34×10^{-05}	2.01×10^{-05}	4.02×10^{-04}	5.59×10^{-04}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
BUTYL BENZOATE	6.06×10^{-05}	6.56×10^{-06}	9.83×10^{-06}	1.96×10^{-04}	2.73×10^{-04}
BUTYL CARBITOL	1.13×10^{-04}	1.22×10^{-05}	1.83×10^{-05}	3.64×10^{-04}	5.07×10^{-04}
BUTYL CELLOSOLVE	1.27×10^{-04}	1.37×10^{-05}	2.06×10^{-05}	4.11×10^{-04}	5.72×10^{-04}
BUTYLCYCLOHEXANE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
BUTYLISOPROPYLPHTHALATE	1.44×10^{-05}	1.56×10^{-06}	2.34×10^{-06}	4.67×10^{-05}	6.50×10^{-05}
BUTYRALDEHYDE	1.27×10^{-04}	1.37×10^{-05}	2.06×10^{-05}	4.11×10^{-04}	5.72×10^{-04}
C10 AROMATIC	5.30×10^{-03}	5.73×10^{-04}	8.59×10^{-04}	1.71×10^{-02}	2.39×10^{-02}
C10 OLEFINS	8.66×10^{-06}	9.37×10^{-07}	1.40×10^{-06}	2.80×10^{-05}	3.90×10^{-05}
C10 PARAFFINS	3.80×10^{-04}	4.11×10^{-05}	6.16×10^{-05}	1.23×10^{-03}	1.71×10^{-03}
C2 ALKYL INDAN	1.16×10^{-05}	1.25×10^{-06}	1.87×10^{-06}	3.74×10^{-05}	5.20×10^{-05}
C2 CYCLOHEXANE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
C3 CYCLOHEXANE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
C3/C4/C5 ALKYLBENZENES	8.66×10^{-06}	9.37×10^{-07}	1.40×10^{-06}	2.80×10^{-05}	3.90×10^{-05}
C-3-HEXENE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
C4 SUBSTITUTED CYCLOHEXANE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
C4 SUBSTITUTED CYCLOHEXANONE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
C5 ESTER	5.78×10^{-06}	6.24×10^{-07}	9.37×10^{-07}	1.87×10^{-05}	2.60×10^{-05}
C5 OLEFIN	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
C5 PARAFFIN	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
C5 SUBSTITUTED CYCLOHEXANE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
C6 SUBSTITUTED CYCLOHEXANE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
C6H18O3SI3	2.60×10^{-05}	2.81×10^{-06}	4.21×10^{-06}	8.41×10^{-05}	1.17×10^{-04}
C-7 CYCLOPARAFFINS	2.05×10^{-04}	2.22×10^{-05}	3.32×10^{-05}	6.63×10^{-04}	9.24×10^{-04}
C7-C16 PARAFFINS	4.33×10^{-05}	4.68×10^{-06}	7.02×10^{-06}	1.40×10^{-04}	1.95×10^{-04}
C-8 CYCLOPARAFFINS	1.44×10^{-05}	1.56×10^{-06}	2.34×10^{-06}	4.67×10^{-05}	6.50×10^{-05}
C8 PARAFFIN	5.78×10^{-06}	6.24×10^{-07}	9.37×10^{-07}	1.87×10^{-05}	2.60×10^{-05}
C8H24O4SI4	8.66×10^{-06}	9.37×10^{-07}	1.40×10^{-06}	2.80×10^{-05}	3.90×10^{-05}
CAMPHENE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
CARBITOL	1.33×10^{-04}	1.44×10^{-05}	2.15×10^{-05}	4.30×10^{-04}	5.98×10^{-04}
CARBON MONOXIDE	6.55	7.08×10^{-01}	1.06	$2.12 \times 10^{+01}$	$2.95 \times 10^{+01}$
CARBON SULFIDE	2.60×10^{-05}	2.81×10^{-06}	4.21×10^{-06}	8.41×10^{-05}	1.17×10^{-04}
CARBON TETRACHLORIDE	1.88×10^{-04}	2.03×10^{-05}	3.04×10^{-05}	6.07×10^{-04}	8.46×10^{-04}
CARBONYL SULFIDE	8.66×10^{-06}	9.37×10^{-07}	1.40×10^{-06}	2.80×10^{-05}	3.90×10^{-05}
CELLOSOLVE	1.04×10^{-04}	1.12×10^{-05}	1.69×10^{-05}	3.36×10^{-04}	4.68×10^{-04}
CELLOSOLVE ACETATE	1.04×10^{-04}	1.12×10^{-05}	1.69×10^{-05}	3.36×10^{-04}	4.68×10^{-04}
CHLOROBENZENE	2.05×10^{-04}	2.22×10^{-05}	3.32×10^{-05}	6.63×10^{-04}	9.24×10^{-04}
CHLORODIFLUOROMETHANE	4.62×10^{-05}	4.99×10^{-06}	7.49×10^{-06}	1.49×10^{-04}	2.08×10^{-04}
CHLOROFORM	1.47×10^{-04}	1.59×10^{-05}	2.39×10^{-05}	4.76×10^{-04}	6.63×10^{-04}
CHLOROPENTAFLUOROETHANE	5.78×10^{-06}	6.24×10^{-07}	9.37×10^{-07}	1.87×10^{-05}	2.60×10^{-05}
CHLOROPRENE	9.82×10^{-05}	1.06×10^{-05}	1.59×10^{-05}	3.18×10^{-04}	4.42×10^{-04}
CHLOROTRIFLUOROMETHANE	1.44×10^{-05}	1.56×10^{-06}	2.34×10^{-06}	4.67×10^{-05}	6.50×10^{-05}
CHROMIUM (III) COMPOUNDS	2.08×10^{-07}	2.24×10^{-08}	3.37×10^{-08}	6.71×10^{-07}	9.35×10^{-07}
CHROMIUM (VI) COMPOUNDS	8.89×10^{-08}	9.62×10^{-09}	1.44×10^{-08}	2.88×10^{-07}	4.01×10^{-07}
CHRYSENE	3.81×10^{-06}	4.12×10^{-07}	6.17×10^{-07}	1.23×10^{-05}	1.71×10^{-05}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
CIS-2-BUTENE	9.20×10^{-04}	9.94×10^{-05}	1.49×10^{-04}	2.97×10^{-03}	4.14×10^{-03}
CIS-2-PENTENE	4.00×10^{-04}	4.32×10^{-05}	6.48×10^{-05}	1.29×10^{-03}	1.80×10^{-03}
COPPER AND COMPOUNDS	8.89×10^{-07}	9.62×10^{-08}	1.44×10^{-07}	2.88×10^{-06}	4.01×10^{-06}
CORONENE	8.91×10^{-07}	9.63×10^{-08}	1.44×10^{-07}	2.88×10^{-06}	4.01×10^{-06}
CREOSOTE	1.07×10^{-04}	1.16×10^{-05}	1.73×10^{-05}	3.46×10^{-04}	4.81×10^{-04}
CRESOL	1.10×10^{-04}	1.19×10^{-05}	1.78×10^{-05}	3.55×10^{-04}	4.94×10^{-04}
CROTONALDEHYDE	1.40×10^{-04}	1.51×10^{-05}	2.27×10^{-05}	4.53×10^{-04}	6.30×10^{-04}
CYCLOHEXANE	3.24×10^{-03}	3.50×10^{-04}	5.25×10^{-04}	1.05×10^{-02}	1.46×10^{-02}
CYCLOHEXANOL	1.30×10^{-04}	1.40×10^{-05}	2.11×10^{-05}	4.20×10^{-04}	5.85×10^{-04}
CYCLOHEXANONE	1.53×10^{-04}	1.65×10^{-05}	2.48×10^{-05}	4.95×10^{-04}	6.89×10^{-04}
CYCLOHEXENE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
CYCLOPENTA(C,D)PYRENE	1.00×10^{-05}	1.08×10^{-06}	1.63×10^{-06}	3.25×10^{-05}	4.52×10^{-05}
CYCLOPENTANE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
CYCLOPENTENE	5.40×10^{-04}	5.84×10^{-05}	8.75×10^{-05}	1.75×10^{-03}	2.43×10^{-03}
DENATURANT	2.89×10^{-05}	3.12×10^{-06}	4.68×10^{-06}	9.34×10^{-05}	1.30×10^{-04}
DIBENZO(A,H)ANTHRACENE	4.90×10^{-06}	5.30×10^{-07}	7.94×10^{-07}	1.58×10^{-05}	2.21×10^{-05}
DIBUTYL PHTHALATE	1.16×10^{-05}	1.25×10^{-06}	1.87×10^{-06}	3.74×10^{-05}	5.20×10^{-05}
DICHLOROBENZENES	5.78×10^{-06}	6.24×10^{-07}	9.37×10^{-07}	1.87×10^{-05}	2.60×10^{-05}
DICHLORODIFLUOROMETHANE	1.01×10^{-04}	1.09×10^{-05}	1.64×10^{-05}	3.27×10^{-04}	4.55×10^{-04}
DICHLOROMETHANE	2.17×10^{-04}	2.34×10^{-05}	3.51×10^{-05}	7.00×10^{-04}	9.76×10^{-04}
DICHLOROTETRAFLUORETHANE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
DIETHYLCYCLOHEXANE	8.66×10^{-06}	9.37×10^{-07}	1.40×10^{-06}	2.80×10^{-05}	3.90×10^{-05}
DIETHYLENE GLYCOL	1.27×10^{-04}	1.37×10^{-05}	2.06×10^{-05}	4.11×10^{-04}	5.72×10^{-04}
DIISOPROPYL BENZENE	1.10×10^{-04}	1.19×10^{-05}	1.78×10^{-05}	3.55×10^{-04}	4.94×10^{-04}
DIMETHYL FORMAMIDE	1.04×10^{-04}	1.12×10^{-05}	1.69×10^{-05}	3.36×10^{-04}	4.68×10^{-04}
DIMETHYL PHTHALATE	1.73×10^{-05}	1.87×10^{-06}	2.81×10^{-06}	5.60×10^{-05}	7.80×10^{-05}
DIMETHYLCYCLOHEXANE	1.44×10^{-05}	1.56×10^{-06}	2.34×10^{-06}	4.67×10^{-05}	6.50×10^{-05}
DIMETHYLCYCLOPENTANE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
DIMETHYLETHER	3.23×10^{-04}	3.50×10^{-05}	5.24×10^{-05}	1.05×10^{-03}	1.46×10^{-03}
DIMETHYLHEXENE	2.60×10^{-04}	2.81×10^{-05}	4.21×10^{-05}	8.40×10^{-04}	1.17×10^{-03}
DIMETHYLOCTANES	8.66×10^{-06}	9.37×10^{-07}	1.40×10^{-06}	2.80×10^{-05}	3.90×10^{-05}
DIPROPYLENE GLYCOL	1.91×10^{-04}	2.06×10^{-05}	3.09×10^{-05}	6.16×10^{-04}	8.59×10^{-04}
D-LIMONENE	1.44×10^{-05}	1.56×10^{-06}	2.34×10^{-06}	4.67×10^{-05}	6.50×10^{-05}
DODECENE	1.44×10^{-04}	1.56×10^{-05}	2.34×10^{-05}	4.67×10^{-04}	6.50×10^{-04}
EPICHLOROHYDRIN	1.21×10^{-04}	1.31×10^{-05}	1.97×10^{-05}	3.92×10^{-04}	5.46×10^{-04}
ETHANE	3.58×10^{-03}	3.87×10^{-04}	5.80×10^{-04}	1.16×10^{-02}	1.61×10^{-02}
ETHANOLAMINE	1.27×10^{-04}	1.37×10^{-05}	2.06×10^{-05}	4.11×10^{-04}	5.72×10^{-04}
ETHYL ACETATE	1.27×10^{-04}	1.37×10^{-05}	2.06×10^{-05}	4.11×10^{-04}	5.72×10^{-04}
ETHYL ACRYLATE	1.44×10^{-04}	1.56×10^{-05}	2.34×10^{-05}	4.67×10^{-04}	6.50×10^{-04}
ETHYL ALCOHOL	3.93×10^{-04}	4.25×10^{-05}	6.37×10^{-05}	1.27×10^{-03}	1.77×10^{-03}
ETHYL CHLORIDE	8.37×10^{-05}	9.05×10^{-06}	1.36×10^{-05}	2.71×10^{-04}	3.77×10^{-04}
ETHYL ETHER	1.79×10^{-04}	1.94×10^{-05}	2.90×10^{-05}	5.79×10^{-04}	8.06×10^{-04}
ETHYL MERCAPTAN	9.53×10^{-05}	1.03×10^{-05}	1.55×10^{-05}	3.08×10^{-04}	4.29×10^{-04}
ETHYL STYRENE	8.66×10^{-06}	9.37×10^{-07}	1.40×10^{-06}	2.80×10^{-05}	3.90×10^{-05}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
ETHYLBENZENE	5.19×10^{-03}	5.61×10^{-04}	8.42×10^{-04}	1.68×10^{-02}	2.34×10^{-02}
ETHYLCYCLOHEXANE	5.78×10^{-06}	6.24×10^{-07}	9.37×10^{-07}	1.87×10^{-05}	2.60×10^{-05}
ETHYLCYCLOPENTANE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
ETHYLENE	1.68×10^{-02}	1.82×10^{-03}	2.73×10^{-03}	5.44×10^{-02}	7.57×10^{-02}
ETHYLENE DIBROMIDE	1.21×10^{-04}	1.31×10^{-05}	1.97×10^{-05}	3.92×10^{-04}	5.46×10^{-04}
ETHYLENE DICHLORIDE	1.67×10^{-04}	1.81×10^{-05}	2.72×10^{-05}	5.42×10^{-04}	7.54×10^{-04}
ETHYLENE GLYCOL	1.07×10^{-04}	1.16×10^{-05}	1.73×10^{-05}	3.46×10^{-04}	4.81×10^{-04}
ETHYLENE OXIDE	1.10×10^{-04}	1.19×10^{-05}	1.78×10^{-05}	3.55×10^{-04}	4.94×10^{-04}
ETHYLENEAMINES	1.27×10^{-04}	1.37×10^{-05}	2.06×10^{-05}	4.11×10^{-04}	5.72×10^{-04}
ETHYLHEPTENE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
ETHYLHEXANE	5.78×10^{-06}	6.24×10^{-07}	9.37×10^{-07}	1.87×10^{-05}	2.60×10^{-05}
ETHYLISOPROPYL ETHER	5.78×10^{-06}	6.24×10^{-07}	9.37×10^{-07}	1.87×10^{-05}	2.60×10^{-05}
ETHYLMETHYLCYCLOHEXANES	5.78×10^{-06}	6.24×10^{-07}	9.37×10^{-07}	1.87×10^{-05}	2.60×10^{-05}
ETHYL-PHENYL-PHENYL-ETHANE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
ETHYLTOLUENE	5.78×10^{-06}	6.24×10^{-07}	9.37×10^{-07}	1.87×10^{-05}	2.60×10^{-05}
FLUORANTHENE	1.60×10^{-05}	1.73×10^{-06}	2.60×10^{-06}	5.19×10^{-05}	7.22×10^{-05}
FLUORENE	2.82×10^{-05}	3.05×10^{-06}	4.58×10^{-06}	9.13×10^{-05}	1.27×10^{-04}
FORMALDEHYDE	4.49×10^{-03}	4.86×10^{-04}	7.29×10^{-04}	1.45×10^{-02}	2.02×10^{-02}
FORMIC ACID	1.21×10^{-04}	1.31×10^{-05}	1.97×10^{-05}	3.92×10^{-04}	5.46×10^{-04}
GLYOXAL	5.78×10^{-06}	6.24×10^{-07}	9.37×10^{-07}	1.87×10^{-05}	2.60×10^{-05}
HEPTENE	1.47×10^{-04}	1.59×10^{-05}	2.39×10^{-05}	4.76×10^{-04}	6.63×10^{-04}
HEXADECANE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
HEXAFLUOROETHANE	1.16×10^{-04}	1.25×10^{-05}	1.87×10^{-05}	3.74×10^{-04}	5.20×10^{-04}
HEXAMETHYLENEDIAMINE	1.93×10^{-04}	2.09×10^{-05}	3.14×10^{-05}	6.26×10^{-04}	8.72×10^{-04}
HEXYLENE GLYCOL	1.04×10^{-04}	1.12×10^{-05}	1.69×10^{-05}	3.36×10^{-04}	4.68×10^{-04}
INDANE	1.08×10^{-03}	1.17×10^{-04}	1.75×10^{-04}	3.49×10^{-03}	4.86×10^{-03}
INDENO(1,2,3-C,D)PYRENE	2.37×10^{-07}	2.56×10^{-08}	3.85×10^{-08}	7.67×10^{-07}	1.07×10^{-06}
ISOBUTANE	1.24×10^{-03}	1.34×10^{-04}	2.01×10^{-04}	4.01×10^{-03}	5.58×10^{-03}
ISOBUTYL ACRYLATE	1.10×10^{-04}	1.19×10^{-05}	1.78×10^{-05}	3.55×10^{-04}	4.94×10^{-04}
ISOBUTYL ALCOHOL	1.21×10^{-04}	1.31×10^{-05}	1.97×10^{-05}	3.92×10^{-04}	5.46×10^{-04}
ISOBUTYL ISOBUTYRATE	1.13×10^{-04}	1.22×10^{-05}	1.83×10^{-05}	3.64×10^{-04}	5.07×10^{-04}
ISOBUTYLBENZENE	9.80×10^{-04}	1.06×10^{-04}	1.59×10^{-04}	3.17×10^{-03}	4.41×10^{-03}
ISOBUTYLENE	2.82×10^{-03}	3.05×10^{-04}	4.57×10^{-04}	9.12×10^{-03}	1.27×10^{-02}
ISOBUTYRALDEHYDE	1.21×10^{-04}	1.31×10^{-05}	1.97×10^{-05}	3.92×10^{-04}	5.46×10^{-04}
ISOMERS OF BUTENE	1.44×10^{-05}	1.56×10^{-06}	2.34×10^{-06}	4.67×10^{-05}	6.50×10^{-05}
ISOMERS OF BUTYLBENZENE	1.73×10^{-05}	1.87×10^{-06}	2.81×10^{-06}	5.60×10^{-05}	7.80×10^{-05}
ISOMERS OF C10H18	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
ISOMERS OF DECANE	1.16×10^{-04}	1.25×10^{-05}	1.87×10^{-05}	3.74×10^{-04}	5.20×10^{-04}
ISOMERS OF DIETHYLBENZENE	8.66×10^{-06}	9.37×10^{-07}	1.40×10^{-06}	2.80×10^{-05}	3.90×10^{-05}
ISOMERS OF DODECANE	1.33×10^{-04}	1.44×10^{-05}	2.15×10^{-05}	4.30×10^{-04}	5.98×10^{-04}
ISOMERS OF ETHYLTOLUENE	1.16×10^{-05}	1.25×10^{-06}	1.87×10^{-06}	3.74×10^{-05}	5.20×10^{-05}
ISOMERS OF HEPTADECANE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
ISOMERS OF HEPTANE	7.22×10^{-05}	7.80×10^{-06}	1.17×10^{-05}	2.33×10^{-04}	3.25×10^{-04}
ISOMERS OF HEXANE	1.56×10^{-04}	1.69×10^{-05}	2.53×10^{-05}	5.04×10^{-04}	7.02×10^{-04}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
ISOMERS OF NONANE	5.49×10^{-05}	5.93×10^{-06}	8.90×10^{-06}	1.77×10^{-04}	2.47×10^{-04}
ISOMERS OF OCTADECANE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
ISOMERS OF OCTANE	4.33×10^{-05}	4.68×10^{-06}	7.02×10^{-06}	1.40×10^{-04}	1.95×10^{-04}
ISOMERS OF PENTADECANE	1.21×10^{-04}	1.31×10^{-05}	1.97×10^{-05}	3.92×10^{-04}	5.46×10^{-04}
ISOMERS OF PENTANE	3.21×10^{-04}	3.47×10^{-05}	5.20×10^{-05}	1.04×10^{-03}	1.44×10^{-03}
ISOMERS OF PENTENE	1.44×10^{-05}	1.56×10^{-06}	2.34×10^{-06}	4.67×10^{-05}	6.50×10^{-05}
ISOMERS OF PROPYLBENZENE	5.78×10^{-06}	6.24×10^{-07}	9.37×10^{-07}	1.87×10^{-05}	2.60×10^{-05}
ISOMERS OF TETRADECANE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
ISOMERS OF UNDECANE	1.44×10^{-05}	1.56×10^{-06}	2.34×10^{-06}	4.67×10^{-05}	6.50×10^{-05}
ISOMERS OF XYLENE	1.78×10^{-02}	1.92×10^{-03}	2.88×10^{-03}	5.74×10^{-02}	8.00×10^{-02}
ISOPENTANE	7.02×10^{-03}	7.59×10^{-04}	1.14×10^{-03}	2.27×10^{-02}	3.16×10^{-02}
ISOPRENE	3.40×10^{-04}	3.67×10^{-05}	5.51×10^{-05}	1.10×10^{-03}	1.53×10^{-03}
ISOPROPYL ACETATE	1.36×10^{-04}	1.47×10^{-05}	2.20×10^{-05}	4.39×10^{-04}	6.11×10^{-04}
ISOPROPYL ALCOHOL	2.11×10^{-04}	2.28×10^{-05}	3.42×10^{-05}	6.82×10^{-04}	9.50×10^{-04}
ISOPROPYLBENZENE	1.10×10^{-04}	1.19×10^{-05}	1.78×10^{-05}	3.55×10^{-04}	4.94×10^{-04}
LACTOL SPIRITS	1.04×10^{-04}	1.12×10^{-05}	1.69×10^{-05}	3.36×10^{-04}	4.68×10^{-04}
LEAD AND COMPOUNDS	1.99×10^{-05}	2.16×10^{-06}	3.23×10^{-06}	6.45×10^{-05}	8.98×10^{-05}
MALEIC ANHYDRIDE	2.02×10^{-05}	2.19×10^{-06}	3.28×10^{-06}	6.54×10^{-05}	9.11×10^{-05}
MANGANESE AND COMPOUNDS	5.93×10^{-07}	6.41×10^{-08}	9.62×10^{-08}	1.92×10^{-06}	2.67×10^{-06}
M-DIETHYLBENZENE	1.14×10^{-03}	1.23×10^{-04}	1.85×10^{-04}	3.69×10^{-03}	5.13×10^{-03}
METHANE	2.19×10^{-02}	2.37×10^{-03}	3.56×10^{-03}	7.09×10^{-02}	9.88×10^{-02}
METHYL ACETATE	2.05×10^{-04}	2.22×10^{-05}	3.32×10^{-05}	6.63×10^{-04}	9.24×10^{-04}
METHYL ACRYLATE	1.10×10^{-04}	1.19×10^{-05}	1.78×10^{-05}	3.55×10^{-04}	4.94×10^{-04}
METHYL ALCOHOL	4.04×10^{-04}	4.37×10^{-05}	6.56×10^{-05}	1.31×10^{-03}	1.82×10^{-03}
METHYL AMYL KETONE	1.47×10^{-04}	1.59×10^{-05}	2.39×10^{-05}	4.76×10^{-04}	6.63×10^{-04}
METHYL CARBITOL	1.13×10^{-04}	1.22×10^{-05}	1.83×10^{-05}	3.64×10^{-04}	5.07×10^{-04}
METHYL CELLOSOLVE	1.13×10^{-04}	1.22×10^{-05}	1.83×10^{-05}	3.64×10^{-04}	5.07×10^{-04}
METHYL ETHYL KETONE	3.52×10^{-04}	3.81×10^{-05}	5.71×10^{-05}	1.14×10^{-03}	1.59×10^{-03}
METHYL FORMATE	6.06×10^{-05}	6.56×10^{-06}	9.83×10^{-06}	1.96×10^{-04}	2.73×10^{-04}
METHYL GLYOXAL	5.78×10^{-06}	6.24×10^{-07}	9.37×10^{-07}	1.87×10^{-05}	2.60×10^{-05}
METHYL ISOBUTYL KETONE	1.62×10^{-04}	1.75×10^{-05}	2.62×10^{-05}	5.23×10^{-04}	7.28×10^{-04}
METHYL METHACRYLATE	1.33×10^{-04}	1.44×10^{-05}	2.15×10^{-05}	4.30×10^{-04}	5.98×10^{-04}
METHYL MYRISTATE	8.66×10^{-06}	9.37×10^{-07}	1.40×10^{-06}	2.80×10^{-05}	3.90×10^{-05}
METHYL NAPHTHALENES	1.16×10^{-05}	1.25×10^{-06}	1.87×10^{-06}	3.74×10^{-05}	5.20×10^{-05}
METHYL PALMITATE	2.31×10^{-05}	2.50×10^{-06}	3.75×10^{-06}	7.47×10^{-05}	1.04×10^{-04}
METHYL STEARATE	3.18×10^{-05}	3.43×10^{-06}	5.15×10^{-06}	1.03×10^{-04}	1.43×10^{-04}
METHYL STYRENE	1.18×10^{-04}	1.28×10^{-05}	1.92×10^{-05}	3.83×10^{-04}	5.33×10^{-04}
METHYL TERT-BUTYL ETHER	4.84×10^{-02}	5.23×10^{-03}	7.85×10^{-03}	1.56×10^{-01}	2.18×10^{-01}
METHYLACETYLENE	3.40×10^{-04}	3.67×10^{-05}	5.51×10^{-05}	1.10×10^{-03}	1.53×10^{-03}
METHYLAL	4.91×10^{-05}	5.31×10^{-06}	7.96×10^{-06}	1.59×10^{-04}	2.21×10^{-04}
METHYLALLENE	1.16×10^{-04}	1.25×10^{-05}	1.87×10^{-05}	3.74×10^{-04}	5.20×10^{-04}
METHYLCYCLOHEXANE	9.40×10^{-04}	1.02×10^{-04}	1.52×10^{-04}	3.04×10^{-03}	4.23×10^{-03}
METHYLCYCLOPENTANE	1.22×10^{-03}	1.32×10^{-04}	1.98×10^{-04}	3.94×10^{-03}	5.49×10^{-03}
METHYLCYCLOPENTENE	4.00×10^{-05}	4.32×10^{-06}	6.48×10^{-06}	1.29×10^{-04}	1.80×10^{-04}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
METHYLDECANES	5.78×10^{-06}	6.24×10^{-07}	9.37×10^{-07}	1.87×10^{-05}	2.60×10^{-05}
METHYLENE BROMIDE	8.66×10^{-06}	9.37×10^{-07}	1.40×10^{-06}	2.80×10^{-05}	3.90×10^{-05}
METHYLHEXANE	8.66×10^{-06}	9.37×10^{-07}	1.40×10^{-06}	2.80×10^{-05}	3.90×10^{-05}
METHYLNONANE	5.78×10^{-06}	6.24×10^{-07}	9.37×10^{-07}	1.87×10^{-05}	2.60×10^{-05}
METHYLOCTANES	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
METHYLPENTANE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
METHYLPROPYLCYCLOHEXANES	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
M-ETHYLTOLUENE	2.50×10^{-03}	2.70×10^{-04}	4.05×10^{-04}	8.08×10^{-03}	1.13×10^{-02}
METHYLUNDECANE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
MINERAL SPIRITS	1.85×10^{-04}	2.00×10^{-05}	3.00×10^{-05}	5.98×10^{-04}	8.32×10^{-04}
MYRCENE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
NAPHTHA	1.36×10^{-04}	1.47×10^{-05}	2.20×10^{-05}	4.39×10^{-04}	6.11×10^{-04}
NAPHTHALENE	6.33×10^{-04}	6.84×10^{-05}	1.03×10^{-04}	2.05×10^{-03}	2.85×10^{-03}
N-BUTANE	7.62×10^{-03}	8.23×10^{-04}	1.24×10^{-03}	2.46×10^{-02}	3.43×10^{-02}
N-BUTYL ACETATE	1.67×10^{-04}	1.81×10^{-05}	2.72×10^{-05}	5.42×10^{-04}	7.54×10^{-04}
N-BUTYL ALCOHOL	1.99×10^{-04}	2.15×10^{-05}	3.23×10^{-05}	6.44×10^{-04}	8.98×10^{-04}
N-DECANE	4.00×10^{-04}	4.32×10^{-05}	6.48×10^{-05}	1.29×10^{-03}	1.80×10^{-03}
N-DODECANE	5.49×10^{-05}	5.93×10^{-06}	8.90×10^{-06}	1.77×10^{-04}	2.47×10^{-04}
N-HEPTANE	1.06×10^{-03}	1.15×10^{-04}	1.72×10^{-04}	3.43×10^{-03}	4.77×10^{-03}
N-HEXANE	2.60×10^{-03}	2.81×10^{-04}	4.22×10^{-04}	8.41×10^{-03}	1.17×10^{-02}
NICKEL AND COMPOUNDS	2.96×10^{-07}	3.21×10^{-08}	4.81×10^{-08}	9.59×10^{-07}	1.34×10^{-06}
NITRIC OXIDE	1.95×10^{-01}	2.11×10^{-02}	3.16×10^{-02}	6.30×10^{-01}	8.78×10^{-01}
NITROBENZENE	9.53×10^{-05}	1.03×10^{-05}	1.55×10^{-05}	3.08×10^{-04}	4.29×10^{-04}
NITROGEN DIOXIDE	1.57×10^{-02}	1.70×10^{-03}	2.55×10^{-03}	5.09×10^{-02}	7.08×10^{-02}
N-NONANE	5.00×10^{-04}	5.40×10^{-05}	8.10×10^{-05}	1.62×10^{-03}	2.25×10^{-03}
N-OCTANE	6.00×10^{-04}	6.48×10^{-05}	9.73×10^{-05}	1.94×10^{-03}	2.70×10^{-03}
NONENONE	5.78×10^{-06}	6.24×10^{-07}	9.37×10^{-07}	1.87×10^{-05}	2.60×10^{-05}
N-PENTADECANE	4.91×10^{-05}	5.31×10^{-06}	7.96×10^{-06}	1.59×10^{-04}	2.21×10^{-04}
N-PENTANE	3.20×10^{-03}	3.46×10^{-04}	5.19×10^{-04}	1.03×10^{-02}	1.44×10^{-02}
N-PENTYLCYCLOHEXANE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
N-PROPYL ACETATE	1.41×10^{-04}	1.53×10^{-05}	2.29×10^{-05}	4.58×10^{-04}	6.37×10^{-04}
N-PROPYL ALCOHOL	1.21×10^{-04}	1.31×10^{-05}	1.97×10^{-05}	3.92×10^{-04}	5.46×10^{-04}
N-PROPYLBENZENE	1.12×10^{-03}	1.21×10^{-04}	1.82×10^{-04}	3.62×10^{-03}	5.04×10^{-03}
N-TETRADECANE	2.02×10^{-05}	2.19×10^{-06}	3.28×10^{-06}	6.54×10^{-05}	9.11×10^{-05}
N-TRIDECANE	2.89×10^{-05}	3.12×10^{-06}	4.68×10^{-06}	9.34×10^{-05}	1.30×10^{-04}
N-UNDECANE	1.20×10^{-03}	1.30×10^{-04}	1.95×10^{-04}	3.88×10^{-03}	5.40×10^{-03}
OCTAMETHYLCYCLOTETRASILOXANE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
O-DICHLOROBENZENE	1.16×10^{-04}	1.25×10^{-05}	1.87×10^{-05}	3.74×10^{-04}	5.20×10^{-04}
O-ETHYLTOLUENE	5.20×10^{-04}	5.62×10^{-05}	8.43×10^{-05}	1.68×10^{-03}	2.34×10^{-03}
OXIDES OF NITROGEN	3.14×10^{-01}	3.40×10^{-02}	5.10×10^{-02}	1.02	1.42
PALMITIC ACID	5.78×10^{-05}	6.24×10^{-06}	9.37×10^{-06}	1.87×10^{-04}	2.60×10^{-04}
PARAFFINS (C16-C34)	5.78×10^{-06}	6.24×10^{-07}	9.37×10^{-07}	1.87×10^{-05}	2.60×10^{-05}
PARTICULATE MATTER < 10 µm	2.96×10^{-03}	3.21×10^{-04}	4.81×10^{-04}	9.59×10^{-03}	1.34×10^{-02}
PARTICULATE MATTER < 2.5 µm	2.73×10^{-03}	2.95×10^{-04}	4.42×10^{-04}	8.82×10^{-03}	1.23×10^{-02}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
P-DICHLOROBENZENE	2.08×10^{-04}	2.25×10^{-05}	3.37×10^{-05}	6.72×10^{-04}	9.37×10^{-04}
PHENANTHRENE	2.96×10^{-05}	3.20×10^{-06}	4.80×10^{-06}	9.58×10^{-05}	1.33×10^{-04}
PHENOL	1.27×10^{-04}	1.37×10^{-05}	2.06×10^{-05}	4.11×10^{-04}	5.72×10^{-04}
PHENYL ISOCYANATE	3.47×10^{-05}	3.75×10^{-06}	5.62×10^{-06}	1.12×10^{-04}	1.56×10^{-04}
PHTHALIC ANHYDRIDE	5.78×10^{-05}	6.24×10^{-06}	9.37×10^{-06}	1.87×10^{-04}	2.60×10^{-04}
PIPERYLENE	1.16×10^{-04}	1.25×10^{-05}	1.87×10^{-05}	3.74×10^{-04}	5.20×10^{-04}
POLYCHLORINATED DIOXINS AND FURANS	4.25×10^{-14}	4.60×10^{-15}	6.90×10^{-15}	1.38×10^{-13}	1.92×10^{-13}
POLYCYCLIC AROMATIC HYDROCARBONS	8.76×10^{-04}	9.47×10^{-05}	1.42×10^{-04}	2.83×10^{-03}	3.94×10^{-03}
PROPADIENE	2.60×10^{-04}	2.81×10^{-05}	4.21×10^{-05}	8.40×10^{-04}	1.17×10^{-03}
PROPANE	6.93×10^{-04}	7.49×10^{-05}	1.12×10^{-04}	2.24×10^{-03}	3.12×10^{-03}
PROPIONALDEHYDE	4.93×10^{-04}	5.33×10^{-05}	7.99×10^{-05}	1.59×10^{-03}	2.22×10^{-03}
PROPIONIC ACID	1.16×10^{-04}	1.25×10^{-05}	1.87×10^{-05}	3.74×10^{-04}	5.20×10^{-04}
PROPYLCYCLOHEXANE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
PROPYLENE	5.76×10^{-03}	6.22×10^{-04}	9.34×10^{-04}	1.86×10^{-02}	2.59×10^{-02}
PROPYLENE DICHLORIDE	5.78×10^{-06}	6.24×10^{-07}	9.37×10^{-07}	1.87×10^{-05}	2.60×10^{-05}
PROPYLENE GLYCOL	1.10×10^{-04}	1.19×10^{-05}	1.78×10^{-05}	3.55×10^{-04}	4.94×10^{-04}
PROPYLENE OXIDE	1.44×10^{-04}	1.56×10^{-05}	2.34×10^{-05}	4.67×10^{-04}	6.50×10^{-04}
PYRENE	3.62×10^{-05}	3.91×10^{-06}	5.86×10^{-06}	1.17×10^{-04}	1.63×10^{-04}
RETENE	1.22×10^{-05}	1.32×10^{-06}	1.98×10^{-06}	3.94×10^{-05}	5.49×10^{-05}
S-BUTYL ALCOHOL	9.82×10^{-05}	1.06×10^{-05}	1.59×10^{-05}	3.18×10^{-04}	4.42×10^{-04}
S-BUTYLBENZENE	3.40×10^{-04}	3.67×10^{-05}	5.51×10^{-05}	1.10×10^{-03}	1.53×10^{-03}
STYRENE	1.99×10^{-04}	2.15×10^{-05}	3.22×10^{-05}	6.43×10^{-04}	8.95×10^{-04}
SUBSTITUTED C9 ESTER (C12)	2.60×10^{-05}	2.81×10^{-06}	4.21×10^{-06}	8.41×10^{-05}	1.17×10^{-04}
SULFUR DIOXIDE	3.00×10^{-03}	3.25×10^{-04}	4.87×10^{-04}	9.72×10^{-03}	1.35×10^{-02}
T-3-HEXENE	4.00×10^{-04}	4.32×10^{-05}	6.48×10^{-05}	1.29×10^{-03}	1.80×10^{-03}
TERT-BUTYL ALCOHOL	1.21×10^{-04}	1.31×10^{-05}	1.97×10^{-05}	3.92×10^{-04}	5.46×10^{-04}
TETRACHLOROETHYLENE	2.02×10^{-04}	2.19×10^{-05}	3.28×10^{-05}	6.54×10^{-04}	9.11×10^{-04}
TETRAFLUOROMETHANE	8.66×10^{-06}	9.37×10^{-07}	1.40×10^{-06}	2.80×10^{-05}	3.90×10^{-05}
TOLUENE	1.88×10^{-02}	2.03×10^{-03}	3.05×10^{-03}	6.09×10^{-02}	8.48×10^{-02}
TOLUENE DIISOCYANATE	1.91×10^{-04}	2.06×10^{-05}	3.09×10^{-05}	6.16×10^{-04}	8.59×10^{-04}
TOTAL AROMATIC AMINES	1.16×10^{-05}	1.25×10^{-06}	1.87×10^{-06}	3.74×10^{-05}	5.20×10^{-05}
TOTAL C2-C5 ALDEHYDES	3.47×10^{-05}	3.75×10^{-06}	5.62×10^{-06}	1.12×10^{-04}	1.56×10^{-04}
TOTAL SUSPENDED PARTICULATES	3.12×10^{-03}	3.37×10^{-04}	5.06×10^{-04}	1.01×10^{-02}	1.41×10^{-02}
TOTAL VOCS	2.62×10^{-01}	2.83×10^{-02}	4.25×10^{-02}	8.47×10^{-01}	1.18
TRANS-2-BUTENE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
TRANS-2-PENTENE	6.80×10^{-04}	7.35×10^{-05}	1.10×10^{-04}	2.20×10^{-03}	3.06×10^{-03}
TRICHLOROBENZENES	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}
TRICHLOROETHYLENE	1.24×10^{-04}	1.34×10^{-05}	2.01×10^{-05}	4.02×10^{-04}	5.59×10^{-04}
TRICHLOROFLUOROMETHANE	1.76×10^{-04}	1.90×10^{-05}	2.86×10^{-05}	5.70×10^{-04}	7.93×10^{-04}
TRICHLOROTRIFLUOROETHANE	1.16×10^{-04}	1.25×10^{-05}	1.87×10^{-05}	3.74×10^{-04}	5.20×10^{-04}
TRIFLUOROMETHANE	8.66×10^{-05}	9.37×10^{-06}	1.40×10^{-05}	2.80×10^{-04}	3.90×10^{-04}
TRIMETHYLBENZENE	3.18×10^{-05}	3.43×10^{-06}	5.15×10^{-06}	1.03×10^{-04}	1.43×10^{-04}
TRIMETHYLCYCLOHEXANES	5.78×10^{-06}	6.24×10^{-07}	9.37×10^{-07}	1.87×10^{-05}	2.60×10^{-05}
TRIMETHYLCYCLOPENTANE	2.89×10^{-06}	3.12×10^{-07}	4.68×10^{-07}	9.34×10^{-06}	1.30×10^{-05}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
TRIMETHYLDECENE	5.78×10^{-06}	6.24×10^{-07}	9.37×10^{-07}	1.87×10^{-05}	2.60×10^{-05}
TRIMETHYLFLUOROSILANE	1.99×10^{-04}	2.15×10^{-05}	3.23×10^{-05}	6.44×10^{-04}	8.98×10^{-04}
TRIMETHYLHEPTANES	5.78×10^{-06}	6.24×10^{-07}	9.37×10^{-07}	1.87×10^{-05}	2.60×10^{-05}
VINYL ACETATE	1.59×10^{-04}	1.72×10^{-05}	2.58×10^{-05}	5.14×10^{-04}	7.15×10^{-04}
VINYL CHLORIDE	1.21×10^{-04}	1.31×10^{-05}	1.97×10^{-05}	3.92×10^{-04}	5.46×10^{-04}
ZINC AND COMPOUNDS	1.51×10^{-05}	1.63×10^{-06}	2.45×10^{-06}	4.89×10^{-05}	6.81×10^{-05}

Table C1.18: Annual Emissions from Industrial Off-Road Vehicles and Equipment – CNG, LNG and LPG

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
1,2,3-TRIMETHYLBENZENE	1.35×10^{-02}	1.46×10^{-03}	2.20×10^{-03}	4.38×10^{-02}	6.10×10^{-02}
1,2,4-TRIMETHYLBENZENE	1.35×10^{-02}	1.46×10^{-03}	2.20×10^{-03}	4.38×10^{-02}	6.10×10^{-02}
1,3,5-TRIMETHYLBENZENE	2.71×10^{-02}	2.93×10^{-03}	4.39×10^{-03}	8.76×10^{-02}	1.22×10^{-01}
1,3-BUTADIENE	1.67×10^{-03}	1.81×10^{-04}	2.72×10^{-04}	5.42×10^{-03}	7.55×10^{-03}
1-NONENE	1.35×10^{-02}	1.46×10^{-03}	2.20×10^{-03}	4.38×10^{-02}	6.10×10^{-02}
1-PENTENE	1.35×10^{-02}	1.46×10^{-03}	2.20×10^{-03}	4.38×10^{-02}	6.10×10^{-02}
2,2-DIMETHYLBUTANE	1.35×10^{-02}	1.46×10^{-03}	2.20×10^{-03}	4.38×10^{-02}	6.10×10^{-02}
2,4-DIMETHYLPENTANE	1.35×10^{-02}	1.46×10^{-03}	2.20×10^{-03}	4.38×10^{-02}	6.10×10^{-02}
2-METHYL-1-PENTENE	2.71×10^{-02}	2.93×10^{-03}	4.39×10^{-03}	8.76×10^{-02}	1.22×10^{-01}
2-METHYL-2-BUTENE	1.35×10^{-02}	1.46×10^{-03}	2.20×10^{-03}	4.38×10^{-02}	6.10×10^{-02}
3-METHYLHEPTANE	2.71×10^{-02}	2.93×10^{-03}	4.39×10^{-03}	8.76×10^{-02}	1.22×10^{-01}
3-METHYLHEXANE	1.35×10^{-02}	1.46×10^{-03}	2.20×10^{-03}	4.38×10^{-02}	6.10×10^{-02}
3-METHYLPENTANE	2.71×10^{-02}	2.93×10^{-03}	4.39×10^{-03}	8.76×10^{-02}	1.22×10^{-01}
ACETALDEHYDE	1.87×10^{-02}	2.02×10^{-03}	3.03×10^{-03}	6.04×10^{-02}	8.41×10^{-02}
ACETYLENE	4.33×10^{-01}	4.68×10^{-02}	7.02×10^{-02}	1.40	1.95
BENZENE	2.86×10^{-04}	3.09×10^{-05}	4.64×10^{-05}	9.25×10^{-04}	1.29×10^{-03}
C10 AROMATIC	1.35×10^{-02}	1.46×10^{-03}	2.20×10^{-03}	4.38×10^{-02}	6.10×10^{-02}
C10 OLEFINS	2.71×10^{-02}	2.93×10^{-03}	4.39×10^{-03}	8.76×10^{-02}	1.22×10^{-01}
C3/C4/C5 ALKYLBENZENES	1.35×10^{-02}	1.46×10^{-03}	2.20×10^{-03}	4.38×10^{-02}	6.10×10^{-02}
C9 OLEFINS	5.41×10^{-02}	5.85×10^{-03}	8.78×10^{-03}	1.75×10^{-01}	2.44×10^{-01}
CARBON MONOXIDE	$1.73 \times 10^{+02}$	$1.87 \times 10^{+01}$	$2.81 \times 10^{+01}$	$5.61 \times 10^{+02}$	$7.81 \times 10^{+02}$
CHROMIUM (III) COMPOUNDS	1.16×10^{-03}	1.26×10^{-04}	1.89×10^{-04}	3.76×10^{-03}	5.24×10^{-03}
CHROMIUM (VI) COMPOUNDS	1.16×10^{-03}	1.26×10^{-04}	1.89×10^{-04}	3.76×10^{-03}	5.24×10^{-03}
CIS-2-BUTENE	2.71×10^{-02}	2.93×10^{-03}	4.39×10^{-03}	8.76×10^{-02}	1.22×10^{-01}
COBALT AND COMPOUNDS	4.23×10^{-03}	4.57×10^{-04}	6.86×10^{-04}	1.37×10^{-02}	1.91×10^{-02}
COPPER AND COMPOUNDS	1.06×10^{-04}	1.14×10^{-05}	1.72×10^{-05}	3.42×10^{-04}	4.76×10^{-04}
CYCLOHEXANE	1.35×10^{-02}	1.46×10^{-03}	2.20×10^{-03}	4.38×10^{-02}	6.10×10^{-02}
CYCLOPENTANE	2.71×10^{-02}	2.93×10^{-03}	4.39×10^{-03}	8.76×10^{-02}	1.22×10^{-01}
ETHANE	$1.90 \times 10^{+01}$	2.05	3.07	$6.13 \times 10^{+01}$	$8.54 \times 10^{+01}$
ETHYLBENZENE	1.35×10^{-02}	1.46×10^{-03}	2.20×10^{-03}	4.38×10^{-02}	6.10×10^{-02}
ETHYLENE	8.53×10^{-01}	9.22×10^{-02}	1.38×10^{-01}	2.76	3.84
FORMALDEHYDE	5.40×10^{-02}	5.84×10^{-03}	8.76×10^{-03}	1.75×10^{-01}	2.43×10^{-01}
HEPTENE	1.35×10^{-02}	1.46×10^{-03}	2.20×10^{-03}	4.38×10^{-02}	6.10×10^{-02}
ISOBUTANE	5.82×10^{-01}	6.29×10^{-02}	9.44×10^{-02}	1.88	2.62
ISOBUTYLENE	2.71×10^{-02}	2.93×10^{-03}	4.39×10^{-03}	8.76×10^{-02}	1.22×10^{-01}
ISOBUTYRALDEHYDE	2.71×10^{-02}	2.93×10^{-03}	4.39×10^{-03}	8.76×10^{-02}	1.22×10^{-01}
ISOMERS OF BUTENE	3.52×10^{-01}	3.81×10^{-02}	5.71×10^{-02}	1.14	1.59
ISOMERS OF DECANE	2.71×10^{-02}	2.93×10^{-03}	4.39×10^{-03}	8.76×10^{-02}	1.22×10^{-01}
ISOMERS OF HEPTANE	5.41×10^{-02}	5.85×10^{-03}	8.78×10^{-03}	1.75×10^{-01}	2.44×10^{-01}
ISOMERS OF HEXANE	2.71×10^{-02}	2.93×10^{-03}	4.39×10^{-03}	8.76×10^{-02}	1.22×10^{-01}
ISOMERS OF NONANE	1.35×10^{-02}	1.46×10^{-03}	2.20×10^{-03}	4.38×10^{-02}	6.10×10^{-02}
ISOMERS OF OCTANE	2.71×10^{-02}	2.93×10^{-03}	4.39×10^{-03}	8.76×10^{-02}	1.22×10^{-01}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
ISOMERS OF PENTANE	1.76×10^{-01}	1.90×10^{-02}	2.85×10^{-02}	5.69×10^{-01}	7.93×10^{-01}
ISOMERS OF XYLENE	2.71×10^{-02}	2.93×10^{-03}	4.39×10^{-03}	8.76×10^{-02}	1.22×10^{-01}
LEAD AND COMPOUNDS	1.06×10^{-04}	1.14×10^{-05}	1.72×10^{-05}	3.42×10^{-04}	4.76×10^{-04}
MANGANESE AND COMPOUNDS	1.06×10^{-04}	1.14×10^{-05}	1.72×10^{-05}	3.42×10^{-04}	4.76×10^{-04}
METHANE	$1.04 \times 10^{+02}$	$1.12 \times 10^{+01}$	$1.68 \times 10^{+01}$	$3.36 \times 10^{+02}$	$4.68 \times 10^{+02}$
METHYLCYCLOHEXANE	2.71×10^{-02}	2.93×10^{-03}	4.39×10^{-03}	8.76×10^{-02}	1.22×10^{-01}
METHYLCYCLOPENTANE	5.41×10^{-02}	5.85×10^{-03}	8.78×10^{-03}	1.75×10^{-01}	2.44×10^{-01}
M-ETHYLTOLUENE	1.35×10^{-02}	1.46×10^{-03}	2.20×10^{-03}	4.38×10^{-02}	6.10×10^{-02}
M-XYLENE	1.35×10^{-02}	1.46×10^{-03}	2.20×10^{-03}	4.38×10^{-02}	6.10×10^{-02}
N-BUTANE	1.35	1.46×10^{-01}	2.20×10^{-01}	4.38	6.10
N-DECANE	1.35×10^{-02}	1.46×10^{-03}	2.20×10^{-03}	4.38×10^{-02}	6.10×10^{-02}
N-HEPTANE	2.71×10^{-02}	2.93×10^{-03}	4.39×10^{-03}	8.76×10^{-02}	1.22×10^{-01}
N-HEXANE	2.71×10^{-02}	2.93×10^{-03}	4.39×10^{-03}	8.76×10^{-02}	1.22×10^{-01}
NICKEL AND COMPOUNDS	1.16×10^{-03}	1.26×10^{-04}	1.89×10^{-04}	3.76×10^{-03}	5.24×10^{-03}
NITRIC OXIDE	$2.16 \times 10^{+01}$	2.34	3.51	$7.00 \times 10^{+01}$	$9.75 \times 10^{+01}$
NITROGEN DIOXIDE	1.75	1.89×10^{-01}	2.83×10^{-01}	5.65	7.87
N-NONANE	1.35×10^{-02}	1.46×10^{-03}	2.20×10^{-03}	4.38×10^{-02}	6.10×10^{-02}
N-OCTANE	2.71×10^{-02}	2.93×10^{-03}	4.39×10^{-03}	8.76×10^{-02}	1.22×10^{-01}
N-PENTANE	1.76×10^{-01}	1.90×10^{-02}	2.85×10^{-02}	5.69×10^{-01}	7.93×10^{-01}
N-UNDECANE	1.35×10^{-02}	1.46×10^{-03}	2.20×10^{-03}	4.38×10^{-02}	6.10×10^{-02}
OCTENE	1.35×10^{-02}	1.46×10^{-03}	2.20×10^{-03}	4.38×10^{-02}	6.10×10^{-02}
O-ETHYLTOLUENE	1.35×10^{-02}	1.46×10^{-03}	2.20×10^{-03}	4.38×10^{-02}	6.10×10^{-02}
OXIDES OF NITROGEN	$3.49 \times 10^{+01}$	3.78	5.66	$1.13 \times 10^{+02}$	$1.57 \times 10^{+02}$
O-XYLENE	1.35×10^{-02}	1.46×10^{-03}	2.20×10^{-03}	4.38×10^{-02}	6.10×10^{-02}
PARTICULATE MATTER < 10 µm	2.12×10^{-01}	2.29×10^{-02}	3.43×10^{-02}	6.84×10^{-01}	9.53×10^{-01}
PARTICULATE MATTER < 2.5 µm	2.12×10^{-01}	2.29×10^{-02}	3.43×10^{-02}	6.84×10^{-01}	9.53×10^{-01}
PROPANE	3.94	4.26×10^{-01}	6.39×10^{-01}	$1.27 \times 10^{+01}$	$1.77 \times 10^{+01}$
PROPYLENE	2.29	2.47×10^{-01}	3.71×10^{-01}	7.40	$1.03 \times 10^{+01}$
SULFUR DIOXIDE	1.51×10^{-01}	1.63×10^{-02}	2.44×10^{-02}	4.88×10^{-01}	6.79×10^{-01}
TOLUENE	5.41×10^{-02}	5.85×10^{-03}	8.78×10^{-03}	1.75×10^{-01}	2.44×10^{-01}
TOTAL SUSPENDED PARTICULATES	2.23×10^{-01}	2.41×10^{-02}	3.61×10^{-02}	7.20×10^{-01}	1.00
TOTAL VOCS	$3.03 \times 10^{+01}$	3.28	4.92	$9.81 \times 10^{+01}$	$1.37 \times 10^{+02}$
TRANS-2-BUTENE	1.76×10^{-01}	1.90×10^{-02}	2.85×10^{-02}	5.69×10^{-01}	7.93×10^{-01}
TRANS-2-PENTENE	1.35×10^{-02}	1.46×10^{-03}	2.20×10^{-03}	4.38×10^{-02}	6.10×10^{-02}
ZINC AND COMPOUNDS	1.16×10^{-03}	1.26×10^{-04}	1.89×10^{-04}	3.76×10^{-03}	5.24×10^{-03}

Table C1.19: Annual Emissions from Industrial Off-Road Vehicles and Equipment – Diesel

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
1,2,4-TRIMETHYLBENZENE	4.65×10^{-01}	5.03×10^{-02}	7.54×10^{-02}	1.50	2.09
1,3,5-TRIMETHYLBENZENE	1.37×10^{-01}	1.49×10^{-02}	2.23×10^{-02}	4.45×10^{-01}	6.19×10^{-01}
1,3-BUTADIENE	1.64×10^{-01}	1.77×10^{-02}	2.66×10^{-02}	5.30×10^{-01}	7.38×10^{-01}
1-METHYL-3-ETHYLBENZENE	1.11×10^{-01}	1.20×10^{-02}	1.80×10^{-02}	3.59×10^{-01}	5.00×10^{-01}
1-METHYL-4-ETHYLBENZENE	2.75×10^{-01}	2.97×10^{-02}	4.46×10^{-02}	8.89×10^{-01}	1.24
1-METHYLNAPHTHALENE	2.00×10^{-01}	2.16×10^{-02}	3.24×10^{-02}	6.46×10^{-01}	9.00×10^{-01}
1-METHYLPHENANTHRENE	8.99×10^{-03}	9.72×10^{-04}	1.46×10^{-03}	2.91×10^{-02}	4.05×10^{-02}
2,2,4-TRIMETHYLPENTANE	6.55×10^{-01}	7.08×10^{-02}	1.06×10^{-01}	2.12	2.95
2,2-DIMETHYLBUTANE	1.64×10^{-01}	1.77×10^{-02}	2.66×10^{-02}	5.30×10^{-01}	7.38×10^{-01}
2,3,4-TRIMETHYLPENTANE	1.64×10^{-01}	1.77×10^{-02}	2.66×10^{-02}	5.30×10^{-01}	7.38×10^{-01}
2,3-DIMETHYLBUTANE	3.01×10^{-01}	3.26×10^{-02}	4.89×10^{-02}	9.74×10^{-01}	1.36
2,3-DIMETHYLHEXANE	8.46×10^{-02}	9.15×10^{-03}	1.37×10^{-02}	2.74×10^{-01}	3.81×10^{-01}
2,3-DIMETHYLPENTANE	3.81×10^{-01}	4.11×10^{-02}	6.17×10^{-02}	1.23	1.71
2,4-DIMETHYLHEXANE	2.65×10^{-02}	2.86×10^{-03}	4.29×10^{-03}	8.56×10^{-02}	1.19×10^{-01}
2,4-DIMETHYLPENTANE	2.17×10^{-01}	2.34×10^{-02}	3.51×10^{-02}	7.01×10^{-01}	9.76×10^{-01}
2,5-DIMETHYLHEXANE	2.65×10^{-02}	2.86×10^{-03}	4.29×10^{-03}	8.56×10^{-02}	1.19×10^{-01}
2-METHYL-1-BUTENE	1.37×10^{-01}	1.49×10^{-02}	2.23×10^{-02}	4.45×10^{-01}	6.19×10^{-01}
2-METHYL-2-PENTENE	1.11×10^{-01}	1.20×10^{-02}	1.80×10^{-02}	3.59×10^{-01}	5.00×10^{-01}
2-METHYL-2-PROPENAL	2.11	2.29×10^{-01}	3.43×10^{-01}	6.84	9.52
2-METHYLANTHRACENE	5.47×10^{-03}	5.91×10^{-04}	8.87×10^{-04}	1.77×10^{-02}	2.46×10^{-02}
2-METHYLCHOLANTHRENE	3.80×10^{-02}	4.11×10^{-03}	6.16×10^{-03}	1.23×10^{-01}	1.71×10^{-01}
2-METHYLHEPTANE	5.28×10^{-02}	5.71×10^{-03}	8.57×10^{-03}	1.71×10^{-01}	2.38×10^{-01}
2-METHYLHEXANE	3.01×10^{-01}	3.26×10^{-02}	4.89×10^{-02}	9.74×10^{-01}	1.36
2-METHYLNAPHTHALENE	3.23×10^{-01}	3.49×10^{-02}	5.24×10^{-02}	1.04	1.45
2-METHYLPENTANE	4.92×10^{-01}	5.31×10^{-02}	7.97×10^{-02}	1.59	2.21
3-ETHYLHEXANE	1.11×10^{-01}	1.20×10^{-02}	1.80×10^{-02}	3.59×10^{-01}	5.00×10^{-01}
3-METHYL-1-BUTENE	8.46×10^{-02}	9.15×10^{-03}	1.37×10^{-02}	2.74×10^{-01}	3.81×10^{-01}
3-METHYLHEXANE	1.64×10^{-01}	1.77×10^{-02}	2.66×10^{-02}	5.30×10^{-01}	7.38×10^{-01}
3-METHYLPENTANE	3.54×10^{-01}	3.83×10^{-02}	5.74×10^{-02}	1.15	1.60
3-METHYLPHENANTHRENE	1.60×10^{-02}	1.73×10^{-03}	2.60×10^{-03}	5.18×10^{-02}	7.22×10^{-02}
9-METHYLPHENANTHRENE	1.21×10^{-02}	1.31×10^{-03}	1.96×10^{-03}	3.92×10^{-02}	5.46×10^{-02}
ACENAPHTHENE	8.81×10^{-02}	9.53×10^{-03}	1.43×10^{-02}	2.85×10^{-01}	3.97×10^{-01}
ACENAPHTHYLENE	7.39×10^{-02}	7.99×10^{-03}	1.20×10^{-02}	2.39×10^{-01}	3.33×10^{-01}
ACETALDEHYDE	$2.21 \times 10^{+01}$	2.39	3.58	$7.15 \times 10^{+01}$	$9.95 \times 10^{+01}$
ACETOPHENONE	2.70	2.91×10^{-01}	4.37×10^{-01}	8.72	$1.21 \times 10^{+01}$
ACETYLENE	2.43	2.63×10^{-01}	3.94×10^{-01}	7.86	$1.10 \times 10^{+01}$
ACROLEIN	1.80	1.94×10^{-01}	2.91×10^{-01}	5.81	8.09
ANTHRACENE	1.40×10^{-02}	1.52×10^{-03}	2.27×10^{-03}	4.54×10^{-02}	6.32×10^{-02}
BENZALDEHYDE	2.01	2.17×10^{-01}	3.26×10^{-01}	6.50	9.05
BENZENE	1.45	1.57×10^{-01}	2.35×10^{-01}	4.68	6.52
BENZO(A)ANTHRACENE	1.73×10^{-02}	1.87×10^{-03}	2.80×10^{-03}	5.59×10^{-02}	7.79×10^{-02}
BENZO(A)PYRENE	1.41×10^{-02}	1.53×10^{-03}	2.29×10^{-03}	4.56×10^{-02}	6.36×10^{-02}
BENZO(B)FLUORANTHENE	7.84×10^{-03}	8.47×10^{-04}	1.27×10^{-03}	2.53×10^{-02}	3.53×10^{-02}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
BENZO(E)PYRENE	8.33×10^{-03}	9.01×10^{-04}	1.35×10^{-03}	2.70×10^{-02}	3.75×10^{-02}
BENZO(G,H,I)FLUORANTHENE	3.03×10^{-03}	3.27×10^{-04}	4.91×10^{-04}	9.79×10^{-03}	1.36×10^{-02}
BENZO(G,H,I,)PERYLENE	5.86×10^{-03}	6.34×10^{-04}	9.51×10^{-04}	1.90×10^{-02}	2.64×10^{-02}
BENZO(K)FLUORANTHENE	7.55×10^{-03}	8.16×10^{-04}	1.22×10^{-03}	2.44×10^{-02}	3.40×10^{-02}
BUTYRALDEHYDE	6.87×10^{-01}	7.43×10^{-02}	1.11×10^{-01}	2.22	3.10
CADMIUM AND COMPOUNDS	4.74×10^{-02}	5.12×10^{-03}	7.68×10^{-03}	1.53×10^{-01}	2.13×10^{-01}
CARBON MONOXIDE	$4.86 \times 10^{+02}$	$5.25 \times 10^{+01}$	$7.88 \times 10^{+01}$	$1.57 \times 10^{+03}$	$2.19 \times 10^{+03}$
CHROMIUM (III) COMPOUNDS	5.53×10^{-03}	5.97×10^{-04}	8.96×10^{-04}	1.79×10^{-02}	2.49×10^{-02}
CHROMIUM (VI) COMPOUNDS	2.37×10^{-03}	2.56×10^{-04}	3.84×10^{-04}	7.66×10^{-03}	1.07×10^{-02}
CHRYSENE	9.42×10^{-03}	1.02×10^{-03}	1.53×10^{-03}	3.05×10^{-02}	4.24×10^{-02}
CIS-2-BUTENE	1.37×10^{-01}	1.49×10^{-02}	2.23×10^{-02}	4.45×10^{-01}	6.19×10^{-01}
CIS-2-HEXENE	5.28×10^{-02}	5.71×10^{-03}	8.57×10^{-03}	1.71×10^{-01}	2.38×10^{-01}
COBALT AND COMPOUNDS	7.89×10^{-03}	8.53×10^{-04}	1.28×10^{-03}	2.55×10^{-02}	3.56×10^{-02}
COPPER AND COMPOUNDS	7.89×10^{-03}	8.53×10^{-04}	1.28×10^{-03}	2.55×10^{-02}	3.56×10^{-02}
CORONENE	3.91×10^{-04}	4.23×10^{-05}	6.35×10^{-05}	1.27×10^{-03}	1.76×10^{-03}
CROTONALDEHYDE	7.08	7.66×10^{-01}	1.15	$2.29 \times 10^{+01}$	$3.19 \times 10^{+01}$
CYCLOHEXANE	1.11×10^{-01}	1.20×10^{-02}	1.80×10^{-02}	3.59×10^{-01}	5.00×10^{-01}
CYCLOPENTA(C,D)PYRENE	1.29×10^{-02}	1.40×10^{-03}	2.09×10^{-03}	4.18×10^{-02}	5.82×10^{-02}
CYCLOPENTANE	2.17×10^{-01}	2.34×10^{-02}	3.51×10^{-02}	7.01×10^{-01}	9.76×10^{-01}
CYCLOPENTENE	1.11×10^{-01}	1.20×10^{-02}	1.80×10^{-02}	3.59×10^{-01}	5.00×10^{-01}
DECANOIC ACID	3.85×10^{-02}	4.16×10^{-03}	6.24×10^{-03}	1.24×10^{-01}	1.73×10^{-01}
DECYLCYCLOHEXANE	2.02×10^{-02}	2.19×10^{-03}	3.28×10^{-03}	6.54×10^{-02}	9.11×10^{-02}
DIACETYL	4.76×10^{-01}	5.14×10^{-02}	7.71×10^{-02}	1.54	2.14
DIBENZO(A,H)ANTHRACENE	7.60×10^{-03}	8.22×10^{-04}	1.23×10^{-03}	2.46×10^{-02}	3.42×10^{-02}
DIBENZOFURAN	1.51×10^{-02}	1.64×10^{-03}	2.46×10^{-03}	4.90×10^{-02}	6.82×10^{-02}
EICOSANE	1.09×10^{-01}	1.18×10^{-02}	1.77×10^{-02}	3.52×10^{-01}	4.91×10^{-01}
ETHYLBENZENE	2.48×10^{-01}	2.69×10^{-02}	4.03×10^{-02}	8.03×10^{-01}	1.12
ETHYLENE	4.52	4.89×10^{-01}	7.34×10^{-01}	$1.46 \times 10^{+01}$	$2.04 \times 10^{+01}$
FLUORANTHENE	6.56×10^{-03}	7.09×10^{-04}	1.06×10^{-03}	2.12×10^{-02}	2.95×10^{-02}
FLUORENE	5.52×10^{-02}	5.97×10^{-03}	8.96×10^{-03}	1.79×10^{-01}	2.49×10^{-01}
FORMALDEHYDE	$1.18 \times 10^{+01}$	1.27	1.91	$3.81 \times 10^{+01}$	$5.31 \times 10^{+01}$
GLYOXAL	1.11	1.20×10^{-01}	1.80×10^{-01}	3.59	5.00
HEPTADECANE	3.25×10^{-01}	3.51×10^{-02}	5.26×10^{-02}	1.05	1.46
HEPTANAL	1.69	1.83×10^{-01}	2.74×10^{-01}	5.47	7.62
HEPTYLCYCLOHEXANE	1.05×10^{-02}	1.14×10^{-03}	1.71×10^{-03}	3.41×10^{-02}	4.75×10^{-02}
HEXADECANE	3.76×10^{-01}	4.06×10^{-02}	6.09×10^{-02}	1.22	1.69
HEXALDEHYDE	1.16	1.26×10^{-01}	1.89×10^{-01}	3.76	5.24
HEXYLCYCLOHEXANE	7.91×10^{-03}	8.55×10^{-04}	1.28×10^{-03}	2.56×10^{-02}	3.56×10^{-02}
INDENO(1,2,3-C,D)PYRENE	1.10×10^{-02}	1.19×10^{-03}	1.78×10^{-03}	3.55×10^{-02}	4.94×10^{-02}
ISOBUTYLENE	6.03×10^{-01}	6.51×10^{-02}	9.77×10^{-02}	1.95	2.71
ISOMERS OF XYLENE	1.67	1.81×10^{-01}	2.71×10^{-01}	5.40	7.52
ISOPENTANE	1.45	1.57×10^{-01}	2.35×10^{-01}	4.68	6.52
LAURIC ACID	3.10×10^{-02}	3.35×10^{-03}	5.02×10^{-03}	1.00×10^{-01}	1.39×10^{-01}
LEAD AND COMPOUNDS	7.89×10^{-03}	8.53×10^{-04}	1.28×10^{-03}	2.55×10^{-02}	3.56×10^{-02}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
M & P-XYLENE	1.23	1.33×10^{-01}	2.00×10^{-01}	3.98	5.55
MANGANESE AND COMPOUNDS	7.89×10^{-03}	8.53×10^{-04}	1.28×10^{-03}	2.55×10^{-02}	3.56×10^{-02}
METHYL ETHYL KETONE	3.96	4.29×10^{-01}	6.43×10^{-01}	$1.28 \times 10^{+01}$	$1.79 \times 10^{+01}$
METHYLCYCLOHEXANE	2.75×10^{-01}	2.97×10^{-02}	4.46×10^{-02}	8.89×10^{-01}	1.24
METHYLCYCLOPENTANE	3.28×10^{-01}	3.54×10^{-02}	5.31×10^{-02}	1.06	1.48
METHYLGLYOXAL	8.98×10^{-01}	9.71×10^{-02}	1.46×10^{-01}	2.91	4.05
MYRISTIC ACID	2.83×10^{-03}	3.06×10^{-04}	4.59×10^{-04}	9.16×10^{-03}	1.28×10^{-02}
NAPHTHALENE	4.14×10^{-01}	4.47×10^{-02}	6.71×10^{-02}	1.34	1.86
N-BUTANE	2.02	2.19×10^{-01}	3.28×10^{-01}	6.55	9.12
N-DODECANE	2.66×10^{-01}	2.87×10^{-02}	4.31×10^{-02}	8.60×10^{-01}	1.20
N-HENEICOSANE	3.48×10^{-02}	3.76×10^{-03}	5.64×10^{-03}	1.12×10^{-01}	1.57×10^{-01}
N-HEPTANE	2.48×10^{-01}	2.69×10^{-02}	4.03×10^{-02}	8.03×10^{-01}	1.12
NITRIC OXIDE	$9.14 \times 10^{+02}$	$9.88 \times 10^{+01}$	$1.48 \times 10^{+02}$	$2.95 \times 10^{+03}$	$4.11 \times 10^{+03}$
NITROGEN DIOXIDE	$7.37 \times 10^{+01}$	7.97	$1.20 \times 10^{+01}$	$2.38 \times 10^{+02}$	$3.32 \times 10^{+02}$
N-NONANE	8.46×10^{-02}	9.15×10^{-03}	1.37×10^{-02}	2.74×10^{-01}	3.81×10^{-01}
N-NONYLCYCLOHEXANE	1.31×10^{-02}	1.42×10^{-03}	2.12×10^{-03}	4.23×10^{-02}	5.90×10^{-02}
N-OCTANE	1.37×10^{-01}	1.49×10^{-02}	2.23×10^{-02}	4.45×10^{-01}	6.19×10^{-01}
NONADECANE	2.17×10^{-01}	2.35×10^{-02}	3.52×10^{-02}	7.03×10^{-01}	9.79×10^{-01}
NONANOIC ACID	1.27×10^{-01}	1.37×10^{-02}	2.06×10^{-02}	4.10×10^{-01}	5.72×10^{-01}
N-PENTANE	9.83×10^{-01}	1.06×10^{-01}	1.59×10^{-01}	3.18	4.43
N-PROPYLBENZENE	5.28×10^{-02}	5.71×10^{-03}	8.57×10^{-03}	1.71×10^{-01}	2.38×10^{-01}
N-TRIDECANE	2.52×10^{-01}	2.73×10^{-02}	4.09×10^{-02}	8.15×10^{-01}	1.14
OCTADECANE	3.18×10^{-01}	3.43×10^{-02}	5.15×10^{-02}	1.03	1.43
OCTANAL	1.64	1.77×10^{-01}	2.66×10^{-01}	5.30	7.38
OCTANOIC ACID	6.60×10^{-02}	7.14×10^{-03}	1.07×10^{-02}	2.14×10^{-01}	2.97×10^{-01}
OCTYLCYCLOHEXANE	1.39×10^{-02}	1.50×10^{-03}	2.25×10^{-03}	4.49×10^{-02}	6.25×10^{-02}
OXIDES OF NITROGEN	$1.47 \times 10^{+03}$	$1.59 \times 10^{+02}$	$2.39 \times 10^{+02}$	$4.77 \times 10^{+03}$	$6.64 \times 10^{+03}$
O-XYLENE	4.39×10^{-01}	4.74×10^{-02}	7.11×10^{-02}	1.42	1.98
PARTICULATE MATTER < 10 µm	$7.89 \times 10^{+01}$	8.53	$1.28 \times 10^{+01}$	$2.55 \times 10^{+02}$	$3.56 \times 10^{+02}$
PARTICULATE MATTER < 2.5 µm	$7.66 \times 10^{+01}$	8.28	$1.24 \times 10^{+01}$	$2.48 \times 10^{+02}$	$3.45 \times 10^{+02}$
PENTADECANE	2.10×10^{-01}	2.27×10^{-02}	3.41×10^{-02}	6.80×10^{-01}	9.47×10^{-01}
PENTYLCYCLOHEXANE	4.43×10^{-02}	4.79×10^{-03}	7.19×10^{-03}	1.43×10^{-01}	2.00×10^{-01}
PHENANTHRENE	4.55×10^{-02}	4.92×10^{-03}	7.37×10^{-03}	1.47×10^{-01}	2.05×10^{-01}
POLYCHLORINATED DIOXINS AND FURANS	2.15×10^{-07}	2.33×10^{-08}	3.49×10^{-08}	6.96×10^{-07}	9.70×10^{-07}
POLYCYCLIC AROMATIC HYDROCARBONS	8.07×10^{-01}	8.73×10^{-02}	1.31×10^{-01}	2.61	3.64
PROPIONALDEHYDE	7.40	8.00×10^{-01}	1.20	$2.39 \times 10^{+01}$	$3.33 \times 10^{+01}$
PROPYLENE	4.12×10^{-01}	4.46×10^{-02}	6.68×10^{-02}	1.33	1.86
PYRENE	3.65×10^{-03}	3.95×10^{-04}	5.92×10^{-04}	1.18×10^{-02}	1.65×10^{-02}
RETENE	4.08×10^{-03}	4.41×10^{-04}	6.62×10^{-04}	1.32×10^{-02}	1.84×10^{-02}
SULFUR DIOXIDE	$4.31 \times 10^{+01}$	4.66	6.99	$1.39 \times 10^{+02}$	$1.94 \times 10^{+02}$
TETRADECANE	3.32×10^{-01}	3.59×10^{-02}	5.39×10^{-02}	1.08	1.50
TOLUENE	2.10	2.27×10^{-01}	3.41×10^{-01}	6.80	9.48
TOTAL SUSPENDED PARTICULATES	$8.31 \times 10^{+01}$	8.98	$1.35 \times 10^{+01}$	$2.69 \times 10^{+02}$	$3.74 \times 10^{+02}$
TOTAL VOCS	$9.78 \times 10^{+01}$	$1.06 \times 10^{+01}$	$1.59 \times 10^{+01}$	$3.16 \times 10^{+02}$	$4.41 \times 10^{+02}$

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
TRANS-2-BUTENE	2.75×10^{-01}	2.97×10^{-02}	4.46×10^{-02}	8.89×10^{-01}	1.24
TRANS-2-HEXENE	8.46×10^{-02}	9.15×10^{-03}	1.37×10^{-02}	2.74×10^{-01}	3.81×10^{-01}
TRANS-2-PENTENE	2.65×10^{-02}	2.86×10^{-03}	4.29×10^{-03}	8.56×10^{-02}	1.19×10^{-01}
TRIDECANOIC ACID	6.94×10^{-03}	7.50×10^{-04}	1.12×10^{-03}	2.24×10^{-02}	3.12×10^{-02}
UNDECANOIC ACID	1.09×10^{-01}	1.18×10^{-02}	1.77×10^{-02}	3.52×10^{-01}	4.91×10^{-01}
ZINC AND COMPOUNDS	5.53×10^{-02}	5.97×10^{-03}	8.96×10^{-03}	1.79×10^{-01}	2.49×10^{-01}

Table C1.20: Annual Emissions from Industrial Off-Road Vehicles and Equipment – Wheel Generated Dust

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
ANTIMONY AND COMPOUNDS	1.04×10^{-01}	1.13×10^{-02}	1.69×10^{-02}	3.37×10^{-01}	4.69×10^{-01}
ARSENIC AND COMPOUNDS	1.80×10^{-01}	1.95×10^{-02}	2.92×10^{-02}	5.83×10^{-01}	8.12×10^{-01}
CADMIUM AND COMPOUNDS	2.82×10^{-01}	3.05×10^{-02}	4.58×10^{-02}	9.13×10^{-01}	1.27
COBALT AND COMPOUNDS	1.83	1.98×10^{-01}	2.97×10^{-01}	5.93	8.25
COPPER AND COMPOUNDS	1.15	1.24×10^{-01}	1.87×10^{-01}	3.72	5.18
LEAD AND COMPOUNDS	$1.12 \times 10^{+01}$	1.21	1.81	$3.61 \times 10^{+01}$	$5.03 \times 10^{+01}$
MANGANESE AND COMPOUNDS	$1.25 \times 10^{+01}$	1.35	2.02	$4.03 \times 10^{+01}$	$5.62 \times 10^{+01}$
MERCURY AND COMPOUNDS	1.93×10^{-01}	2.09×10^{-02}	3.13×10^{-02}	6.25×10^{-01}	8.70×10^{-01}
NICKEL AND COMPOUNDS	8.37×10^{-01}	9.05×10^{-02}	1.36×10^{-01}	2.71	3.77
PARTICULATE MATTER < 10 µm	$2.71 \times 10^{+03}$	$2.93 \times 10^{+02}$	$4.40 \times 10^{+02}$	$8.78 \times 10^{+03}$	$1.22 \times 10^{+04}$
PARTICULATE MATTER < 2.5 µm	$1.08 \times 10^{+03}$	$1.16 \times 10^{+02}$	$1.74 \times 10^{+02}$	$3.48 \times 10^{+03}$	$4.85 \times 10^{+03}$
SELENIUM AND COMPOUNDS	1.31×10^{-02}	1.42×10^{-03}	2.13×10^{-03}	4.24×10^{-02}	5.91×10^{-02}
TOTAL SUSPENDED PARTICULATES	$1.29 \times 10^{+04}$	$1.39 \times 10^{+03}$	$2.09 \times 10^{+03}$	$4.16 \times 10^{+04}$	$5.79 \times 10^{+04}$
ZINC AND COMPOUNDS	7.87	8.51×10^{-01}	1.28	$2.54 \times 10^{+01}$	$3.54 \times 10^{+01}$

Table C1.21: Annual Emissions from Loading and Unloading Petroleum Products

SUBSTANCE	EMISSIONS (TONNES/YEAR)		
	SYDNEY	WOLLONGONG	GMR
1,1,4-TRIMETHYLCYCLOHEXANE	2.04×10^{-02}	3.42×10^{-04}	2.07×10^{-02}
1,2,3-TRIMETHYLBENZENE	4.48×10^{-01}	1.25×10^{-03}	4.50×10^{-01}
1,2,4,5-TETRAMETHYLBENZENE	1.38×10^{-03}	-	1.38×10^{-03}
1,2,4-TRIMETHYLBENZENE	3.49×10^{-01}	2.49×10^{-03}	3.52×10^{-01}
1,2-DIMETHYL-4-ETHYLBENZENE	5.23×10^{-03}	8.77×10^{-05}	5.31×10^{-03}
1,3,5-TRIMETHYLBENZENE	3.64×10^{-01}	1.38×10^{-03}	3.65×10^{-01}
1,3-DIETHYLBENZENE	1.40×10^{-03}	2.35×10^{-05}	1.42×10^{-03}
1,3-DIMETHYL-4-ETHYLBENZENE	3.17×10^{-03}	5.32×10^{-05}	3.23×10^{-03}
1,3-DIMETHYL-5-ETHYLBENZENE	3.73×10^{-03}	6.26×10^{-05}	3.80×10^{-03}
1,4-DIETHYLBENZENE	2.80×10^{-03}	4.70×10^{-05}	2.85×10^{-03}
1,4-DIMETHYL-2-ETHYLBENZENE	3.45×10^{-03}	5.79×10^{-05}	3.51×10^{-03}
1,4-PENTADIENE	3.93×10^{-01}	6.58×10^{-03}	3.99×10^{-01}
1-BUTENE	1.81	3.04×10^{-02}	1.84
1-METHYL NAPHTHALENE	1.13×10^{-03}	2.58×10^{-08}	1.13×10^{-03}
1-METHYL-1-ETHYLCYCLOHEXANE	2.33×10^{-02}	3.90×10^{-04}	2.37×10^{-02}
1-METHYL-2N-PROPYLBENZENE	1.49×10^{-03}	2.50×10^{-05}	1.52×10^{-03}
1-METHYL-2-PROPYL CYCLOPENTANE	2.04×10^{-02}	3.42×10^{-04}	2.07×10^{-02}
1-METHYL-3N-PROPYLBENZENE	3.64×10^{-03}	6.10×10^{-05}	3.70×10^{-03}
1-PENTENE	2.14	3.59×10^{-02}	2.18
2,2,3-TRIMETHYLBUTANE	6.67×10^{-02}	1.12×10^{-03}	6.78×10^{-02}
2,2,3-TRIMETHYLHEXANE	4.66×10^{-02}	7.81×10^{-04}	4.73×10^{-02}
2,2,4-TRIMETHYLHEXANE	1.75×10^{-02}	2.93×10^{-04}	1.78×10^{-02}
2,2,4-TRIMETHYLPENTANE	1.90	3.18×10^{-02}	1.93
2,2,5-TRIMETHYLHEPTANE	2.91×10^{-02}	4.88×10^{-04}	2.96×10^{-02}
2,2,5-TRIMETHYLHEXANE	2.33×10^{-02}	3.90×10^{-04}	2.37×10^{-02}
2,2-DIMETHYLBUTANE	5.95×10^{-01}	9.98×10^{-03}	6.05×10^{-01}
2,2-DIMETHYLHEXANE	9.26×10^{-02}	1.55×10^{-03}	9.42×10^{-02}
2,2-DIMETHYLPENTANE	1.78×10^{-01}	2.98×10^{-03}	1.81×10^{-01}
2,3,3-TRIMETHYLPENTANE	2.10×10^{-01}	3.53×10^{-03}	2.14×10^{-01}
2,3,4-TRIMETHYLPENTANE	2.10×10^{-01}	3.53×10^{-03}	2.14×10^{-01}
2,3-DIMETHYLBUTANE	3.18	5.33×10^{-02}	3.23
2,3-DIMETHYLHEXANE	3.28×10^{-01}	5.51×10^{-03}	3.34×10^{-01}
2,3-DIMETHYLPENTANE	7.16×10^{-01}	1.20×10^{-02}	7.28×10^{-01}
2,4-DIMETHYLHEXANE	5.47×10^{-01}	9.18×10^{-03}	5.56×10^{-01}
2,4-DIMETHYLPENTANE	6.56×10^{-01}	1.10×10^{-02}	6.67×10^{-01}
2,5-DIMETHYLHEXANE	2.78×10^{-01}	4.66×10^{-03}	2.82×10^{-01}
2-ETHYLTOLUENE	3.24×10^{-01}	8.28×10^{-04}	3.25×10^{-01}
2-METHYL-1-BUTENE	4.41	7.40×10^{-02}	4.49
2-METHYL-2-BUTENE	$1.73 \times 10^{+01}$	2.90×10^{-01}	$1.76 \times 10^{+01}$
2-METHYLHEPTANE	5.64×10^{-01}	9.46×10^{-03}	5.74×10^{-01}
2-METHYLHEXANE	2.00	3.35×10^{-02}	2.03
2-METHYLNONANE	5.53×10^{-02}	9.27×10^{-04}	5.62×10^{-02}
2-METHYLOCTANE	8.44×10^{-02}	1.42×10^{-03}	8.58×10^{-02}

SUBSTANCE	EMISSIONS (TONNES/YEAR)		
	SYDNEY	WOLLONGONG	GMR
2-METHYLPENTANE	$1.86 \times 10^{+01}$	3.12×10^{-01}	$1.89 \times 10^{+01}$
2-METHYLPROPANE	$1.19 \times 10^{+01}$	1.99×10^{-01}	$1.21 \times 10^{+01}$
3,3-DIMETHYLOCTANE	2.04×10^{-02}	3.42×10^{-04}	2.07×10^{-02}
3,3-DIMETHYLPENTANE	2.49×10^{-01}	4.18×10^{-03}	2.54×10^{-01}
3-ETHYLHEPTANE	1.75×10^{-02}	2.93×10^{-04}	1.78×10^{-02}
3-ETHYLPENTANE	3.98×10^{-01}	6.67×10^{-03}	4.04×10^{-01}
3-ETHYLTOLUENE	3.77×10^{-01}	9.63×10^{-04}	3.78×10^{-01}
3-METHYL-1-BUTENE	1.01×10^{-01}	1.70×10^{-03}	1.03×10^{-01}
3-METHYLHEPTANE	5.39×10^{-01}	9.04×10^{-03}	5.48×10^{-01}
3-METHYLHEXANE	2.44	4.09×10^{-02}	2.48
3-METHYLOCTANE	8.44×10^{-02}	1.42×10^{-03}	8.58×10^{-02}
3-METHYLPENTANE	9.13	1.53×10^{-01}	9.28
4-ETHYLTOLUENE	6.22×10^{-01}	1.59×10^{-03}	6.23×10^{-01}
4-METHYLHEPTANE	2.95×10^{-01}	4.94×10^{-03}	3.00×10^{-01}
4-METHYLNONANE	3.49×10^{-02}	5.86×10^{-04}	3.55×10^{-02}
4-METHYLOCTANE	5.53×10^{-02}	9.27×10^{-04}	5.62×10^{-02}
BENZENE	3.07	5.15×10^{-02}	3.12
BUTYL BENZENE	1.52×10^{-03}	-	1.52×10^{-03}
CIS-1,3-DIMETHYLCYCLOPENTANE	8.75×10^{-01}	1.47×10^{-02}	8.90×10^{-01}
CIS-1,CIS-2,4-TRIMETHYLCYCLOPENTANE	5.39×10^{-01}	9.04×10^{-03}	5.48×10^{-01}
CIS-1-2-DIMETHYLCYCLOPENTANE	5.44×10^{-01}	9.12×10^{-03}	5.53×10^{-01}
CIS-2-BUTENE	1.17	1.96×10^{-02}	1.19
CIS-2-PENTENE	6.30	1.06×10^{-01}	6.41
CUMENE	1.89×10^{-01}	9.08×10^{-04}	1.89×10^{-01}
CYCLOHEXANE	1.95×10^{-01}	3.27×10^{-03}	1.99×10^{-01}
CYCLOOCTANE	1.46×10^{-03}	-	1.46×10^{-03}
CYCLOPENTENE	1.01×10^{-01}	1.70×10^{-03}	1.03×10^{-01}
DODECANE	3.32×10^{-02}	6.63×10^{-05}	3.33×10^{-02}
EICOSANE	4.25×10^{-06}	1.08×10^{-08}	4.26×10^{-06}
ETHANE	$2.60 \times 10^{+01}$	4.73×10^{-02}	$2.60 \times 10^{+01}$
ETHYLBENZENE	4.29×10^{-01}	6.93×10^{-03}	4.36×10^{-01}
ETHYLCYCLOHEXANE	2.91×10^{-02}	4.88×10^{-04}	2.96×10^{-02}
ETHYLCYCLOPENTANE	1.18×10^{-01}	1.98×10^{-03}	1.20×10^{-01}
HEPTADECANE	3.75×10^{-04}	9.58×10^{-07}	3.76×10^{-04}
HEXADECANE	4.88×10^{-03}	2.40×10^{-06}	4.88×10^{-03}
INDANE	3.36×10^{-03}	5.64×10^{-05}	3.42×10^{-03}
ISOMERS OF PENTANE	$1.93 \times 10^{+02}$	3.24	$1.96 \times 10^{+02}$
ISOMERS OF XYLENE	2.45	3.70×10^{-02}	2.49
METHANE	$1.83 \times 10^{+01}$	3.32×10^{-02}	$1.83 \times 10^{+01}$
METHYLCYCLOHEXANE	1.13×10^{-03}	-	1.13×10^{-03}
METHYLCYCLOPENTANE	1.13	1.90×10^{-02}	1.15
M-ETHYLTOLUENE	2.29×10^{-01}	3.84×10^{-03}	2.33×10^{-01}
N-BUTANE	$2.64 \times 10^{+02}$	1.26	$2.65 \times 10^{+02}$
N-DECANE	9.60	9.27×10^{-04}	9.60

SUBSTANCE	EMISSIONS (TONNES/YEAR)		
	SYDNEY	WOLLONGONG	GMR
N-DODECANE	8.86	1.03×10^{-07}	8.86
N-HEPTANE	$7.75 \times 10^{+01}$	1.64×10^{-01}	$7.76 \times 10^{+01}$
N-HEXANE	$7.06 \times 10^{+01}$	2.60×10^{-01}	$7.08 \times 10^{+01}$
N-NONANE	2.35	9.76×10^{-04}	2.35
N-OCTANE	$6.77 \times 10^{+01}$	1.23×10^{-01}	$6.78 \times 10^{+01}$
NONADECANE	2.48×10^{-05}	6.33×10^{-08}	2.48×10^{-05}
N-PENTANE	$1.30 \times 10^{+02}$	2.36×10^{-01}	$1.30 \times 10^{+02}$
N-PROPYLBENZENE	7.10×10^{-02}	1.19×10^{-03}	7.22×10^{-02}
N-UNDECANE	3.49×10^{-02}	5.86×10^{-04}	3.55×10^{-02}
OCTADECANE	1.08×10^{-04}	2.77×10^{-07}	1.09×10^{-04}
O-ETHYLTOLUENE	2.89×10^{-02}	4.84×10^{-04}	2.94×10^{-02}
PENTADECANE	3.51	1.13×10^{-05}	3.51
P-ETHYLTOLUENE	1.01×10^{-01}	1.69×10^{-03}	1.03×10^{-01}
PROPANE	$1.11 \times 10^{+02}$	2.02×10^{-01}	$1.11 \times 10^{+02}$
PROPYLBENZENE	1.93×10^{-01}	4.92×10^{-04}	1.93×10^{-01}
PROPYLCYCLOHEXANE	2.04×10^{-02}	3.42×10^{-04}	2.07×10^{-02}
SEC-BUTYL BENZENE	2.37×10^{-03}	3.98×10^{-05}	2.41×10^{-03}
TETRADECANE	5.71	3.24×10^{-05}	5.71
TETRALIN	1.34×10^{-03}	-	1.34×10^{-03}
TOLUENE	7.47	1.24×10^{-01}	7.60
TOTA VOCS	$1.12 \times 10^{+03}$	7.71	$1.13 \times 10^{+03}$
TRANS 1-METHYL-4-ETHYLCYCLOHEXANE	5.53×10^{-02}	9.27×10^{-04}	5.62×10^{-02}
TRANS-1,2-CIS-4-TRIMETHYLCYCLOPENTANE	1.26×10^{-01}	2.12×10^{-03}	1.28×10^{-01}
TRANS-1,3-DIMETHYLCYCLOPENTANE	2.92×10^{-01}	4.89×10^{-03}	2.97×10^{-01}
TRANS-1,CIS-2,3-TRIMETHYLCYCLOPENTANE	1.43×10^{-01}	2.40×10^{-03}	1.46×10^{-01}
TRANS-1-2-DIMETHYLCYCLOPENTANE	2.12×10^{-01}	3.56×10^{-03}	2.16×10^{-01}
TRANS-2-BUTENE	$1.10 \times 10^{+01}$	1.85×10^{-01}	$1.12 \times 10^{+01}$
TRANS-2-ETHYLMETHYLCYCLOPENTANE	1.26×10^{-01}	2.12×10^{-03}	1.28×10^{-01}
TRANS-2-PENTENE	$1.15 \times 10^{+01}$	1.93×10^{-01}	$1.17 \times 10^{+01}$
TRIDECANE	8.63	4.39×10^{-05}	8.63
UNDECANE	9.89	2.22×10^{-05}	9.89

Table C1.22: Annual Emissions from Railways

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
1,3-BUTADIENE	1.09	1.14×10^{-01}	9.32×10^{-02}	9.75×10^{-01}	2.27
1-BUTENE	$1.01 \times 10^{+01}$	1.05	8.62×10^{-01}	9.02	$2.10 \times 10^{+01}$
2,2,4-TRIMETHYLPENTANE	1.55×10^{-01}	1.61×10^{-02}	1.32×10^{-02}	1.38×10^{-01}	3.23×10^{-01}
ACENAPHTHENE	5.81×10^{-02}	6.06×10^{-03}	4.97×10^{-03}	5.20×10^{-02}	1.21×10^{-01}
ACENAPHTHYLENE	6.80×10^{-02}	7.09×10^{-03}	5.81×10^{-03}	6.08×10^{-02}	1.42×10^{-01}
ACETALDEHYDE	2.05	2.14×10^{-01}	1.75×10^{-01}	1.84	4.28
ACETYLENE	8.51	8.86×10^{-01}	7.27×10^{-01}	7.60	$1.77 \times 10^{+01}$
ACROLEIN	2.25×10^{-01}	2.34×10^{-02}	1.92×10^{-02}	2.01×10^{-01}	4.68×10^{-01}
ANTHRACENE	1.47×10^{-02}	1.53×10^{-03}	1.26×10^{-03}	1.32×10^{-02}	3.07×10^{-02}
ANTIMONY AND COMPOUNDS	5.22×10^{-03}	5.44×10^{-04}	4.46×10^{-04}	4.67×10^{-03}	1.09×10^{-02}
ARSENIC AND COMPOUNDS	1.13×10^{-04}	1.18×10^{-05}	9.69×10^{-06}	1.01×10^{-04}	2.36×10^{-04}
BENZENE	1.20	1.25×10^{-01}	1.02×10^{-01}	1.07	2.49
BENZO(A)ANTHRACENE	1.26×10^{-02}	1.31×10^{-03}	1.07×10^{-03}	1.12×10^{-02}	2.62×10^{-02}
BENZO(A)PYRENE	1.01×10^{-02}	1.05×10^{-03}	8.61×10^{-04}	9.01×10^{-03}	2.10×10^{-02}
BENZO(B)FLUORANTHENE	5.82×10^{-03}	6.06×10^{-04}	4.97×10^{-04}	5.20×10^{-03}	1.21×10^{-02}
BENZO(E)PYRENE	5.89×10^{-03}	6.13×10^{-04}	5.03×10^{-04}	5.26×10^{-03}	1.23×10^{-02}
BENZO(G,H,I)PERYLENE	4.28×10^{-03}	4.46×10^{-04}	3.66×10^{-04}	3.83×10^{-03}	8.92×10^{-03}
BENZO(K)FLUORANTHENE	5.56×10^{-03}	5.80×10^{-04}	4.75×10^{-04}	4.97×10^{-03}	1.16×10^{-02}
BERYLLIUM AND COMPOUNDS	1.37×10^{-03}	1.43×10^{-04}	1.17×10^{-04}	1.23×10^{-03}	2.86×10^{-03}
CADMIUM AND COMPOUNDS	2.53×10^{-03}	2.64×10^{-04}	2.16×10^{-04}	2.26×10^{-03}	5.28×10^{-03}
CARBON MONOXIDE	$2.04 \times 10^{+02}$	$2.13 \times 10^{+01}$	$1.74 \times 10^{+01}$	$1.82 \times 10^{+02}$	$4.25 \times 10^{+02}$
CHROMIUM (III) COMPOUNDS	2.41×10^{-04}	2.51×10^{-05}	2.05×10^{-05}	2.15×10^{-04}	5.01×10^{-04}
CHROMIUM (VI) COMPOUNDS	9.99×10^{-05}	1.04×10^{-05}	8.53×10^{-06}	8.93×10^{-05}	2.08×10^{-04}
CHRYSENE	7.12×10^{-03}	7.42×10^{-04}	6.08×10^{-04}	6.37×10^{-03}	1.48×10^{-02}
COBALT AND COMPOUNDS	2.27×10^{-04}	2.36×10^{-05}	1.94×10^{-05}	2.03×10^{-04}	4.73×10^{-04}
COPPER AND COMPOUNDS	1.13×10^{-03}	1.18×10^{-04}	9.69×10^{-05}	1.01×10^{-03}	2.36×10^{-03}
CORONENE	2.76×10^{-04}	2.88×10^{-05}	2.36×10^{-05}	2.47×10^{-04}	5.76×10^{-04}
CYCLOPENTA(C,D)PYRENE	9.12×10^{-03}	9.50×10^{-04}	7.79×10^{-04}	8.15×10^{-03}	1.90×10^{-02}
DIBENZO(A,H)ANTHRACENE	5.37×10^{-03}	5.59×10^{-04}	4.59×10^{-04}	4.80×10^{-03}	1.12×10^{-02}
ETHANE	2.11	2.20×10^{-01}	1.80×10^{-01}	1.88	4.39
ETHYLBENZENE	4.14×10^{-02}	4.31×10^{-03}	3.53×10^{-03}	3.70×10^{-02}	8.62×10^{-02}
ETHYLENE	$2.16 \times 10^{+01}$	2.25	1.85	$1.93 \times 10^{+01}$	$4.50 \times 10^{+01}$
FLUORANTHENE	7.26×10^{-03}	7.56×10^{-04}	6.20×10^{-04}	6.49×10^{-03}	1.51×10^{-02}
FLUORENE	4.02×10^{-02}	4.19×10^{-03}	3.43×10^{-03}	3.59×10^{-02}	8.37×10^{-02}
FORMALDEHYDE	6.07	6.32×10^{-01}	5.18×10^{-01}	5.42	$1.26 \times 10^{+01}$
INDENO(1,2,3-C,D)PYRENE	7.87×10^{-03}	8.20×10^{-04}	6.72×10^{-04}	7.03×10^{-03}	1.64×10^{-02}
ISOMERS OF XYLENE	1.93×10^{-01}	2.02×10^{-02}	1.65×10^{-02}	1.73×10^{-01}	4.03×10^{-01}
LEAD AND COMPOUNDS	1.13×10^{-03}	1.18×10^{-04}	9.69×10^{-05}	1.01×10^{-03}	2.36×10^{-03}
MANGANESE AND COMPOUNDS	8.71×10^{-04}	9.07×10^{-05}	7.44×10^{-05}	7.78×10^{-04}	1.81×10^{-03}
MERCURY AND COMPOUNDS	9.44×10^{-04}	9.84×10^{-05}	8.07×10^{-05}	8.44×10^{-04}	1.97×10^{-03}
METHANE	8.73	9.10×10^{-01}	7.46×10^{-01}	7.81	$1.82 \times 10^{+01}$
NAPHTHALENE	3.90×10^{-01}	4.06×10^{-02}	3.33×10^{-02}	3.49×10^{-01}	8.13×10^{-01}
N-HEXANE	9.74×10^{-01}	1.01×10^{-01}	8.32×10^{-02}	8.71×10^{-01}	2.03

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
NICKEL AND COMPOUNDS	5.66×10^{-04}	5.90×10^{-05}	4.83×10^{-05}	5.06×10^{-04}	1.18×10^{-03}
NITRIC OXIDE	$9.96 \times 10^{+02}$	$1.04 \times 10^{+02}$	$8.51 \times 10^{+01}$	$8.91 \times 10^{+02}$	$2.08 \times 10^{+03}$
NITROGEN DIOXIDE	$8.04 \times 10^{+01}$	8.38	6.87	$7.19 \times 10^{+01}$	$1.68 \times 10^{+02}$
OXIDES OF NITROGEN	$1.61 \times 10^{+03}$	$1.68 \times 10^{+02}$	$1.37 \times 10^{+02}$	$1.44 \times 10^{+03}$	$3.35 \times 10^{+03}$
PARTICULATE MATTER < 10.0 µm	$4.79 \times 10^{+01}$	4.99	4.09	$4.28 \times 10^{+01}$	$9.98 \times 10^{+01}$
PARTICULATE MATTER < 2.5 µm	$4.33 \times 10^{+01}$	4.51	3.70	$3.87 \times 10^{+01}$	$9.01 \times 10^{+01}$
PHENANTHRENE	4.48×10^{-02}	4.66×10^{-03}	3.83×10^{-03}	4.00×10^{-02}	9.33×10^{-02}
POLYCHLORINATED DIOXINS AND FURANS	1.24×10^{-07}	1.30×10^{-08}	1.06×10^{-08}	1.11×10^{-07}	2.59×10^{-07}
POLYCYCLIC AROMATIC HYDROCARBONS	7.08×10^{-01}	7.37×10^{-02}	6.04×10^{-02}	6.32×10^{-01}	1.47
PROPIONALDEHYDE	4.22×10^{-01}	4.39×10^{-02}	3.60×10^{-02}	3.77×10^{-01}	8.78×10^{-01}
PROPYLENE	$1.30 \times 10^{+01}$	1.36	1.11	$1.16 \times 10^{+01}$	$2.71 \times 10^{+01}$
PYRENE	7.47×10^{-03}	7.78×10^{-04}	6.38×10^{-04}	6.67×10^{-03}	1.56×10^{-02}
RETENE	2.88×10^{-03}	3.00×10^{-04}	2.46×10^{-04}	2.58×10^{-03}	6.00×10^{-03}
SELENIUM AND COMPOUNDS	1.51×10^{-04}	1.58×10^{-05}	1.29×10^{-05}	1.35×10^{-04}	3.15×10^{-04}
STYRENE	1.45×10^{-01}	1.51×10^{-02}	1.24×10^{-02}	1.30×10^{-01}	3.02×10^{-01}
SULFUR DIOXIDE	$2.25 \times 10^{+02}$	$2.34 \times 10^{+01}$	$1.92 \times 10^{+01}$	$2.01 \times 10^{+02}$	$4.68 \times 10^{+02}$
TOLUENE	1.21	1.26×10^{-01}	1.03×10^{-01}	1.08	2.52
TOTAL SUSPENDED PARTICULATES	$5.04 \times 10^{+01}$	5.25	4.31	$4.51 \times 10^{+01}$	$1.05 \times 10^{+02}$
TOTAL VOCS	$6.91 \times 10^{+01}$	7.20	5.90	$6.18 \times 10^{+01}$	$1.44 \times 10^{+02}$
ZINC AND COMPOUNDS	1.51×10^{-02}	1.58×10^{-03}	1.29×10^{-03}	1.35×10^{-02}	3.15×10^{-02}

Table C1.23: Annual Emissions from Recreational Boats – 2-Stroke Petrol

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
1,1,1-TRICHLOROETHANE	1.25	5.94×10^{-02}	8.05×10^{-02}	5.87×10^{-01}	1.97
1,1,2-TRICHLOROETHANE	1.02	4.84×10^{-02}	6.55×10^{-02}	4.77×10^{-01}	1.61
1,2,3-TRIMETHYLBENZENE	$1.62 \times 10^{+01}$	7.70×10^{-01}	1.04	7.60	$2.56 \times 10^{+01}$
1,2,4-TRIMETHYLBENZENE	$5.79 \times 10^{+01}$	2.76	3.73	$2.72 \times 10^{+01}$	$9.16 \times 10^{+01}$
1,2-DIETHYLBENZENE	$1.34 \times 10^{+01}$	6.37×10^{-01}	8.63×10^{-01}	6.29	$2.12 \times 10^{+01}$
1,3,5-TRIMETHYLBENZENE	$4.41 \times 10^{+01}$	2.10	2.85	$2.07 \times 10^{+01}$	$6.98 \times 10^{+01}$
1,3-BUTADIENE	2.95	1.40×10^{-01}	1.90×10^{-01}	1.39	4.67
1,4-BUTANEDIOL	1.16×10^{-01}	5.53×10^{-03}	7.49×10^{-03}	5.46×10^{-02}	1.84×10^{-01}
1-BUTENE	1.16	5.53×10^{-02}	7.49×10^{-02}	5.46×10^{-01}	1.84
1-BUTYNE	5.80×10^{-02}	2.76×10^{-03}	3.74×10^{-03}	2.73×10^{-02}	9.18×10^{-02}
1-CHLOROBUTANE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
1-DECENE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
1-HEXENE	4.39	2.09×10^{-01}	2.83×10^{-01}	2.06	6.95
1-METHYL-3-ISOPROPYLBENZENE	$1.02 \times 10^{+01}$	4.85×10^{-01}	6.57×10^{-01}	4.78	$1.61 \times 10^{+01}$
1-METHYL-3-PROPYLBENZENE	7.78	3.71×10^{-01}	5.02×10^{-01}	3.66	$1.23 \times 10^{+01}$
1-PENTENE	3.79	1.81×10^{-01}	2.45×10^{-01}	1.78	6.00
2,2,4-TRIMETHYLPENTANE	$1.44 \times 10^{+02}$	6.84	9.26	$6.75 \times 10^{+01}$	$2.27 \times 10^{+02}$
2,2,5-TRIMETHYLHEXANE	9.58	4.56×10^{-01}	6.18×10^{-01}	4.50	$1.52 \times 10^{+01}$
2,2-DICHLORONITROANILINE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
2,2-DIMETHYLBUTANE	$1.42 \times 10^{+01}$	6.75×10^{-01}	9.14×10^{-01}	6.66	$2.24 \times 10^{+01}$
2,2-DIMETHYLHEXANE	1.40	6.65×10^{-02}	9.01×10^{-02}	6.57×10^{-01}	2.21
2,3,3-TRIMETHYLPENTANE	$2.20 \times 10^{+01}$	1.05	1.42	$1.03 \times 10^{+01}$	$3.47 \times 10^{+01}$
2,3,4-TRIMETHYLPENTANE	2.20	1.05×10^{-01}	1.42×10^{-01}	1.03	3.47
2,3,5-TRIMETHYLHEXANE	2.20	1.05×10^{-01}	1.42×10^{-01}	1.03	3.47
2,3-DIMETHYLBUTANE	$1.06 \times 10^{+01}$	5.04×10^{-01}	6.82×10^{-01}	4.97	$1.67 \times 10^{+01}$
2,3-DIMETHYLPENTANE	$2.49 \times 10^{+01}$	1.19	1.61	$1.17 \times 10^{+01}$	$3.95 \times 10^{+01}$
2,4,4-TRIMETHYL-1-PENTENE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
2,4,5-TRIMETHYLHEPTANE	8.98	4.28×10^{-01}	5.79×10^{-01}	4.22	$1.42 \times 10^{+01}$
2,4-DIMETHYLHEPTANE	2.59	1.24×10^{-01}	1.67×10^{-01}	1.22	4.10
2,4-DIMETHYLHEXANE	1.74×10^{-01}	8.29×10^{-03}	1.12×10^{-02}	8.18×10^{-02}	2.75×10^{-01}
2,4-DIMETHYLOCTANE	2.00	9.50×10^{-02}	1.29×10^{-01}	9.38×10^{-01}	3.16
2,4-DIMETHYLPENTANE	$1.06 \times 10^{+01}$	5.04×10^{-01}	6.82×10^{-01}	4.97	$1.67 \times 10^{+01}$
2,5-DIMETHYLHEXANE	$1.26 \times 10^{+01}$	5.99×10^{-01}	8.11×10^{-01}	5.91	$1.99 \times 10^{+01}$
2-BUTYNE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
2-FURFURAL	1.07	5.11×10^{-02}	6.93×10^{-02}	5.05×10^{-01}	1.70
2-HEXENE	1.60	7.60×10^{-02}	1.03×10^{-01}	7.50×10^{-01}	2.53
2-METHYL-1-BUTENE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
2-METHYL-2-BUTENE	$1.02 \times 10^{+01}$	4.85×10^{-01}	6.57×10^{-01}	4.78	$1.61 \times 10^{+01}$
2-METHYL-2-PENTENE	4.59	2.19×10^{-01}	2.96×10^{-01}	2.16	7.26
2-METHYL-3-HEXANONE	2.03×10^{-01}	9.67×10^{-03}	1.31×10^{-02}	9.55×10^{-02}	3.21×10^{-01}
2-METHYLDECANE	$2.63 \times 10^{+01}$	1.25	1.70	$1.24 \times 10^{+01}$	$4.17 \times 10^{+01}$
2-METHYLHEPTANE	4.39	2.09×10^{-01}	2.83×10^{-01}	2.06	6.95
2-METHYLOCTANE	3.99×10^{-01}	1.90×10^{-02}	2.58×10^{-02}	1.88×10^{-01}	6.32×10^{-01}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
2-METHYLPENTANE	$2.53 \times 10^{+01}$	1.21	1.64	$1.19 \times 10^{+01}$	$4.01 \times 10^{+01}$
3,4-DIMETHYLOCTANE	$1.92 \times 10^{+01}$	9.12×10^{-01}	1.24	9.01	$3.03 \times 10^{+01}$
3-METHYL-1-BUTENE	3.59	1.71×10^{-01}	2.32×10^{-01}	1.69	5.68
3-METHYLHEPTANE	7.18	3.42×10^{-01}	4.64×10^{-01}	3.38	$1.14 \times 10^{+01}$
3-METHYLHEXANE	$1.84 \times 10^{+01}$	8.74×10^{-01}	1.18	8.63	$2.90 \times 10^{+01}$
3-METHYLPENTANE	$1.72 \times 10^{+01}$	8.17×10^{-01}	1.11	8.07	$2.72 \times 10^{+01}$
4-METHYL-1-PENTENE	4.99	2.38×10^{-01}	3.22×10^{-01}	2.35	7.89
4-METHYLANILINE	8.71×10^{-02}	4.15×10^{-03}	5.62×10^{-03}	4.09×10^{-02}	1.38×10^{-01}
4-METHYLHEPTANE	$1.04 \times 10^{+01}$	4.94×10^{-01}	6.70×10^{-01}	4.88	$1.64 \times 10^{+01}$
ACENAPHTHENE	6.03×10^{-02}	2.87×10^{-03}	3.89×10^{-03}	2.84×10^{-02}	9.55×10^{-02}
ACENAPHTHYLENE	1.11×10^{-01}	5.28×10^{-03}	7.15×10^{-03}	5.21×10^{-02}	1.75×10^{-01}
ACETALDEHYDE	4.78×10^{-01}	2.28×10^{-02}	3.08×10^{-02}	2.25×10^{-01}	7.56×10^{-01}
ACETIC ACID	2.12	1.01×10^{-01}	1.37×10^{-01}	9.96×10^{-01}	3.35
ACETIC ANHYDRIDE	1.02	4.84×10^{-02}	6.55×10^{-02}	4.77×10^{-01}	1.61
ACETONE	4.27	2.03×10^{-01}	2.75×10^{-01}	2.01	6.75
ACETYLENE	$4.49 \times 10^{+01}$	2.14	2.90	$2.11 \times 10^{+01}$	$7.10 \times 10^{+01}$
ACROLEIN	4.51×10^{-02}	2.15×10^{-03}	2.91×10^{-03}	2.12×10^{-02}	7.13×10^{-02}
ACRYLIC ACID	1.31	6.22×10^{-02}	8.42×10^{-02}	6.14×10^{-01}	2.07
ACRYLONITRILE	1.68	8.01×10^{-02}	1.09×10^{-01}	7.91×10^{-01}	2.66
ADIPIC ACID	1.16	5.53×10^{-02}	7.49×10^{-02}	5.46×10^{-01}	1.84
ALIPHATICS	2.90×10^{-01}	1.38×10^{-02}	1.87×10^{-02}	1.36×10^{-01}	4.59×10^{-01}
ALKENE KETONE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
ALPHA-PINENE	1.02	4.84×10^{-02}	6.55×10^{-02}	4.77×10^{-01}	1.61
ANILINE	2.29	1.09×10^{-01}	1.48×10^{-01}	1.08	3.63
ANTHRACENE	6.82×10^{-02}	3.25×10^{-03}	4.40×10^{-03}	3.21×10^{-02}	1.08×10^{-01}
ANTHRAQUINONE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
BENZALDEHYDE	4.79	2.28×10^{-01}	3.09×10^{-01}	2.25	7.58
BENZENE	$2.62 \times 10^{+01}$	1.25	1.69	$1.23 \times 10^{+01}$	$4.14 \times 10^{+01}$
BENZO(A)ANTHRACENE	3.42×10^{-02}	1.63×10^{-03}	2.21×10^{-03}	1.61×10^{-02}	5.41×10^{-02}
BENZO(A)PYRENE	7.01×10^{-02}	3.34×10^{-03}	4.52×10^{-03}	3.29×10^{-02}	1.11×10^{-01}
BENZO(B)FLUORANTHENE	3.51×10^{-02}	1.67×10^{-03}	2.27×10^{-03}	1.65×10^{-02}	5.56×10^{-02}
BENZO(E)PYRENE	2.73×10^{-01}	1.30×10^{-02}	1.76×10^{-02}	1.28×10^{-01}	4.32×10^{-01}
BENZO(G,H,I,)PERYLENE	2.02×10^{-02}	9.61×10^{-04}	1.30×10^{-03}	9.49×10^{-03}	3.19×10^{-02}
BENZO(K)FLUORANTHENE	2.73×10^{-02}	1.30×10^{-03}	1.76×10^{-03}	1.28×10^{-02}	4.32×10^{-02}
BENZOIC ACID	1.16×10^{-01}	5.53×10^{-03}	7.49×10^{-03}	5.46×10^{-02}	1.84×10^{-01}
BENZYL CHLORIDE	1.22	5.80×10^{-02}	7.86×10^{-02}	5.73×10^{-01}	1.93
BETA-PINENE	6.67×10^{-01}	3.18×10^{-02}	4.31×10^{-02}	3.14×10^{-01}	1.06
BIPHENYL	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
B-PHELLANDRENE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
BROMODINITROBENZENE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
BUTOXYBUTENE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
BUTOXYETHOXYETHANOL ACETATE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
BUTYL ACRYLATE	1.25	5.94×10^{-02}	8.05×10^{-02}	5.87×10^{-01}	1.97
BUTYL BENZOATE	6.09×10^{-01}	2.90×10^{-02}	3.93×10^{-02}	2.86×10^{-01}	9.64×10^{-01}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
BUTYL CARBITOL	1.13	5.39×10^{-02}	7.30×10^{-02}	5.32×10^{-01}	1.79
BUTYL CELLOSOLVE	1.28	6.08×10^{-02}	8.24×10^{-02}	6.00×10^{-01}	2.02
BUTYLCYCLOHEXANE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
BUTYLISOPROPYLPHTHALATE	1.45×10^{-01}	6.91×10^{-03}	9.36×10^{-03}	6.82×10^{-02}	2.30×10^{-01}
BUTYRALDEHYDE	1.28	6.08×10^{-02}	8.24×10^{-02}	6.00×10^{-01}	2.02
C10 AROMATIC	$5.29 \times 10^{+01}$	2.52	3.41	$2.49 \times 10^{+01}$	$8.37 \times 10^{+01}$
C10 OLEFINS	8.71×10^{-02}	4.15×10^{-03}	5.62×10^{-03}	4.09×10^{-02}	1.38×10^{-01}
C10 PARAFFINS	3.79	1.81×10^{-01}	2.45×10^{-01}	1.78	6.00
C2 ALKYL INDAN	1.16×10^{-01}	5.53×10^{-03}	7.49×10^{-03}	5.46×10^{-02}	1.84×10^{-01}
C2 CYCLOHEXANE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
C3 CYCLOHEXANE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
C3/C4/C5 ALKYLBENZENES	8.71×10^{-02}	4.15×10^{-03}	5.62×10^{-03}	4.09×10^{-02}	1.38×10^{-01}
C-3-HEXENE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
C4 SUBSTITUTED CYCLOHEXANE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
C4 SUBSTITUTED CYCLOHEXANONE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
C5 ESTER	5.80×10^{-02}	2.76×10^{-03}	3.74×10^{-03}	2.73×10^{-02}	9.18×10^{-02}
C5 OLEFIN	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
C5 PARAFFIN	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
C5 SUBSTITUTED CYCLOHEXANE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
C6 SUBSTITUTED CYCLOHEXANE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
C6H18O3SI3	2.61×10^{-01}	1.24×10^{-02}	1.68×10^{-02}	1.23×10^{-01}	4.13×10^{-01}
C-7 CYCLOPARAFFINS	2.06	9.81×10^{-02}	1.33×10^{-01}	9.68×10^{-01}	3.26
C7-C16 PARAFFINS	4.35×10^{-01}	2.07×10^{-02}	2.81×10^{-02}	2.05×10^{-01}	6.89×10^{-01}
C-8 CYCLOPARAFFINS	1.45×10^{-01}	6.91×10^{-03}	9.36×10^{-03}	6.82×10^{-02}	2.30×10^{-01}
C8 PARAFFIN	5.80×10^{-02}	2.76×10^{-03}	3.74×10^{-03}	2.73×10^{-02}	9.18×10^{-02}
C8H24O4SI4	8.71×10^{-02}	4.15×10^{-03}	5.62×10^{-03}	4.09×10^{-02}	1.38×10^{-01}
CAMPHENE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
CARBITOL	1.33	6.36×10^{-02}	8.61×10^{-02}	6.27×10^{-01}	2.11
CARBON MONOXIDE	$5.17 \times 10^{+03}$	$2.46 \times 10^{+02}$	$3.34 \times 10^{+02}$	$2.43 \times 10^{+03}$	$8.18 \times 10^{+03}$
CARBON SULFIDE	2.61×10^{-01}	1.24×10^{-02}	1.68×10^{-02}	1.23×10^{-01}	4.13×10^{-01}
CARBON TETRACHLORIDE	1.89	8.98×10^{-02}	1.22×10^{-01}	8.87×10^{-01}	2.98
CARBONYL SULFIDE	8.71×10^{-02}	4.15×10^{-03}	5.62×10^{-03}	4.09×10^{-02}	1.38×10^{-01}
CELLOSOLVE	1.04	4.97×10^{-02}	6.74×10^{-02}	4.91×10^{-01}	1.65
CELLOSOLVE ACETATE	1.04	4.97×10^{-02}	6.74×10^{-02}	4.91×10^{-01}	1.65
CHLOROBENZENE	2.06	9.81×10^{-02}	1.33×10^{-01}	9.68×10^{-01}	3.26
CHLORODIFLUOROMETHANE	4.64×10^{-01}	2.21×10^{-02}	3.00×10^{-02}	2.18×10^{-01}	7.35×10^{-01}
CHLOROFORM	1.48	7.05×10^{-02}	9.55×10^{-02}	6.96×10^{-01}	2.34
CHLOROPENTAFLUOROETHANE	5.80×10^{-02}	2.76×10^{-03}	3.74×10^{-03}	2.73×10^{-02}	9.18×10^{-02}
CHLOROPRENE	9.87×10^{-01}	4.70×10^{-02}	6.37×10^{-02}	4.64×10^{-01}	1.56
CHLOROTRIFLUOROMETHANE	1.45×10^{-01}	6.91×10^{-03}	9.36×10^{-03}	6.82×10^{-02}	2.30×10^{-01}
CHROMIUM (III) COMPOUNDS	4.73×10^{-02}	2.25×10^{-03}	3.05×10^{-03}	2.23×10^{-02}	7.49×10^{-02}
CHROMIUM (VI) COMPOUNDS	1.97×10^{-02}	9.39×10^{-04}	1.27×10^{-03}	9.27×10^{-03}	3.12×10^{-02}
CHRYSENE	3.10×10^{-02}	1.47×10^{-03}	2.00×10^{-03}	1.46×10^{-02}	4.90×10^{-02}
CIS-2-BUTENE	9.18	4.37×10^{-01}	5.92×10^{-01}	4.32	$1.45 \times 10^{+01}$

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
CIS-2-PENTENE	3.99	1.90×10^{-01}	2.58×10^{-01}	1.88	6.32
COBALT AND COMPOUNDS	6.71×10^{-02}	3.19×10^{-03}	4.33×10^{-03}	3.15×10^{-02}	1.06×10^{-01}
COPPER AND COMPOUNDS	6.71×10^{-02}	3.19×10^{-03}	4.33×10^{-03}	3.15×10^{-02}	1.06×10^{-01}
CORONENE	7.14×10^{-03}	3.40×10^{-04}	4.61×10^{-04}	3.36×10^{-03}	1.13×10^{-02}
CREOSOTE	1.07	5.11×10^{-02}	6.93×10^{-02}	5.05×10^{-01}	1.70
CRESOL	1.10	5.25×10^{-02}	7.11×10^{-02}	5.18×10^{-01}	1.74
CROTONALDEHYDE	1.40	6.65×10^{-02}	9.01×10^{-02}	6.57×10^{-01}	2.21
CYCLOHEXANE	$3.23 \times 10^{+01}$	1.54	2.09	$1.52 \times 10^{+01}$	$5.12 \times 10^{+01}$
CYCLOHEXANOL	1.31	6.22×10^{-02}	8.42×10^{-02}	6.14×10^{-01}	2.07
CYCLOHEXANONE	1.54	7.32×10^{-02}	9.92×10^{-02}	7.23×10^{-01}	2.43
CYCLOHEXENE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
CYCLOPENTA(C,D)PYRENE	8.04×10^{-02}	3.83×10^{-03}	5.19×10^{-03}	3.78×10^{-02}	1.27×10^{-01}
CYCLOPENTANE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
CYCLOPENTENE	5.39	2.57×10^{-01}	3.48×10^{-01}	2.53	8.53
DENATURANT	2.90×10^{-01}	1.38×10^{-02}	1.87×10^{-02}	1.36×10^{-01}	4.59×10^{-01}
DIBENZO(A,H)ANTHRACENE	3.94×10^{-02}	1.88×10^{-03}	2.54×10^{-03}	1.85×10^{-02}	6.24×10^{-02}
DIBUTYL PHTHALATE	1.16×10^{-01}	5.53×10^{-03}	7.49×10^{-03}	5.46×10^{-02}	1.84×10^{-01}
DICHLOROBENZENES	5.80×10^{-02}	2.76×10^{-03}	3.74×10^{-03}	2.73×10^{-02}	9.18×10^{-02}
DICHLORODIFLUOROMETHANE	1.02	4.84×10^{-02}	6.55×10^{-02}	4.77×10^{-01}	1.61
DICHLOROMETHANE	2.18	1.04×10^{-01}	1.40×10^{-01}	1.02	3.44
DICHLOROTETRAFLUORETHANE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
DIETHYLCYCLOHEXANE	8.71×10^{-02}	4.15×10^{-03}	5.62×10^{-03}	4.09×10^{-02}	1.38×10^{-01}
DIETHYLENE GLYCOL	1.28	6.08×10^{-02}	8.24×10^{-02}	6.00×10^{-01}	2.02
DIISOPROPYL BENZENE	1.10	5.25×10^{-02}	7.11×10^{-02}	5.18×10^{-01}	1.74
DIMETHYL FORMAMIDE	1.04	4.97×10^{-02}	6.74×10^{-02}	4.91×10^{-01}	1.65
DIMETHYL PHTHALATE	1.74×10^{-01}	8.29×10^{-03}	1.12×10^{-02}	8.18×10^{-02}	2.75×10^{-01}
DIMETHYLCYCLOHEXANE	1.45×10^{-01}	6.91×10^{-03}	9.36×10^{-03}	6.82×10^{-02}	2.30×10^{-01}
DIMETHYLCYCLOPENTANE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
DIMETHYLETHER	3.25	1.55×10^{-01}	2.10×10^{-01}	1.53	5.14
DIMETHYLHEXENE	2.59	1.24×10^{-01}	1.67×10^{-01}	1.22	4.10
DIMETHYLOCTANES	8.71×10^{-02}	4.15×10^{-03}	5.62×10^{-03}	4.09×10^{-02}	1.38×10^{-01}
DIPROPYLENE GLYCOL	1.92	9.12×10^{-02}	1.24×10^{-01}	9.00×10^{-01}	3.03
D-LIMONENE	1.45×10^{-01}	6.91×10^{-03}	9.36×10^{-03}	6.82×10^{-02}	2.30×10^{-01}
DODECENE	1.45	6.91×10^{-02}	9.36×10^{-02}	6.82×10^{-01}	2.30
EPICHLOROHYDRIN	1.22	5.80×10^{-02}	7.86×10^{-02}	5.73×10^{-01}	1.93
ETHANE	$3.57 \times 10^{+01}$	1.70	2.30	$1.68 \times 10^{+01}$	$5.65 \times 10^{+01}$
ETHANOLAMINE	1.28	6.08×10^{-02}	8.24×10^{-02}	6.00×10^{-01}	2.02
ETHYL ACETATE	1.28	6.08×10^{-02}	8.24×10^{-02}	6.00×10^{-01}	2.02
ETHYL ACRYLATE	1.45	6.91×10^{-02}	9.36×10^{-02}	6.82×10^{-01}	2.30
ETHYL ALCOHOL	3.95	1.88×10^{-01}	2.55×10^{-01}	1.86	6.24
ETHYL CHLORIDE	8.42×10^{-01}	4.01×10^{-02}	5.43×10^{-02}	3.96×10^{-01}	1.33
ETHYL ETHER	1.80	8.57×10^{-02}	1.16×10^{-01}	8.46×10^{-01}	2.85
ETHYL MERCAPTAN	9.58×10^{-01}	4.56×10^{-02}	6.18×10^{-02}	4.50×10^{-01}	1.52
ETHYL STYRENE	8.71×10^{-02}	4.15×10^{-03}	5.62×10^{-03}	4.09×10^{-02}	1.38×10^{-01}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
ETHYLBENZENE	2.14	1.02×10^{-01}	1.38×10^{-01}	1.01	3.39
ETHYLCYCLOHEXANE	5.80×10^{-02}	2.76×10^{-03}	3.74×10^{-03}	2.73×10^{-02}	9.18×10^{-02}
ETHYLCYCLOPENTANE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
ETHYLENE	$1.68 \times 10^{+02}$	7.99	$1.08 \times 10^{+01}$	$7.89 \times 10^{+01}$	$2.66 \times 10^{+02}$
ETHYLENE DIBROMIDE	1.22	5.80×10^{-02}	7.86×10^{-02}	5.73×10^{-01}	1.93
ETHYLENE DICHLORIDE	1.68	8.01×10^{-02}	1.09×10^{-01}	7.91×10^{-01}	2.66
ETHYLENE GLYCOL	1.07	5.11×10^{-02}	6.93×10^{-02}	5.05×10^{-01}	1.70
ETHYLENE OXIDE	1.10	5.25×10^{-02}	7.11×10^{-02}	5.18×10^{-01}	1.74
ETHYLENEAMINES	1.28	6.08×10^{-02}	8.24×10^{-02}	6.00×10^{-01}	2.02
ETHYLHEPTENE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
ETHYLHEXANE	5.80×10^{-02}	2.76×10^{-03}	3.74×10^{-03}	2.73×10^{-02}	9.18×10^{-02}
ETHYLISOPROPYL ETHER	5.80×10^{-02}	2.76×10^{-03}	3.74×10^{-03}	2.73×10^{-02}	9.18×10^{-02}
ETHYLMETHYLCYCLOHEXANES	5.80×10^{-02}	2.76×10^{-03}	3.74×10^{-03}	2.73×10^{-02}	9.18×10^{-02}
ETHYL-PHENYL-PHENYL-ETHANE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
ETHYLTOLUENE	5.80×10^{-02}	2.76×10^{-03}	3.74×10^{-03}	2.73×10^{-02}	9.18×10^{-02}
FLUORANTHENE	1.43×10^{-01}	6.80×10^{-03}	9.21×10^{-03}	6.71×10^{-02}	2.26×10^{-01}
FLUORENE	2.23×10^{-01}	1.06×10^{-02}	1.44×10^{-02}	1.05×10^{-01}	3.52×10^{-01}
FORMALDEHYDE	1.85	8.79×10^{-02}	1.19×10^{-01}	8.68×10^{-01}	2.92
FORMIC ACID	1.22	5.80×10^{-02}	7.86×10^{-02}	5.73×10^{-01}	1.93
GLYOXAL	5.80×10^{-02}	2.76×10^{-03}	3.74×10^{-03}	2.73×10^{-02}	9.18×10^{-02}
HEPTENE	1.48	7.05×10^{-02}	9.55×10^{-02}	6.96×10^{-01}	2.34
HEXADECANE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
HEXAFLUOROETHANE	1.16	5.53×10^{-02}	7.49×10^{-02}	5.46×10^{-01}	1.84
HEXAMETHYLENEDIAMINE	1.94	9.26×10^{-02}	1.25×10^{-01}	9.14×10^{-01}	3.08
HEXYLENE GLYCOL	1.04	4.97×10^{-02}	6.74×10^{-02}	4.91×10^{-01}	1.65
INDANE	$1.08 \times 10^{+01}$	5.13×10^{-01}	6.95×10^{-01}	5.07	$1.71 \times 10^{+01}$
INDENO(1,2,3-C,D)PYRENE	4.69×10^{-03}	2.24×10^{-04}	3.03×10^{-04}	2.21×10^{-03}	7.43×10^{-03}
ISOBUTANE	$1.24 \times 10^{+01}$	5.89×10^{-01}	7.98×10^{-01}	5.82	$1.96 \times 10^{+01}$
ISOBUTYL ACRYLATE	1.10	5.25×10^{-02}	7.11×10^{-02}	5.18×10^{-01}	1.74
ISOBUTYL ALCOHOL	1.22	5.80×10^{-02}	7.86×10^{-02}	5.73×10^{-01}	1.93
ISOBUTYL ISOBUTYRATE	1.13	5.39×10^{-02}	7.30×10^{-02}	5.32×10^{-01}	1.79
ISOBUTYLBENZENE	9.78	4.66×10^{-01}	6.31×10^{-01}	4.60	$1.55 \times 10^{+01}$
ISOBUTYLENE	$2.81 \times 10^{+01}$	1.34	1.82	$1.32 \times 10^{+01}$	$4.45 \times 10^{+01}$
ISOBUTYRALDEHYDE	1.22	5.80×10^{-02}	7.86×10^{-02}	5.73×10^{-01}	1.93
ISOMERS OF BUTENE	1.45×10^{-01}	6.91×10^{-03}	9.36×10^{-03}	6.82×10^{-02}	2.30×10^{-01}
ISOMERS OF BUTYLBENZENE	1.74×10^{-01}	8.29×10^{-03}	1.12×10^{-02}	8.18×10^{-02}	2.75×10^{-01}
ISOMERS OF C10H18	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
ISOMERS OF DECANE	1.16	5.53×10^{-02}	7.49×10^{-02}	5.46×10^{-01}	1.84
ISOMERS OF DIETHYLBENZENE	8.71×10^{-02}	4.15×10^{-03}	5.62×10^{-03}	4.09×10^{-02}	1.38×10^{-01}
ISOMERS OF DODECANE	1.33	6.36×10^{-02}	8.61×10^{-02}	6.27×10^{-01}	2.11
ISOMERS OF ETHYLTOLUENE	1.16×10^{-01}	5.53×10^{-03}	7.49×10^{-03}	5.46×10^{-02}	1.84×10^{-01}
ISOMERS OF HEPTADECANE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
ISOMERS OF HEPTANE	7.25×10^{-01}	3.45×10^{-02}	4.68×10^{-02}	3.41×10^{-01}	1.15
ISOMERS OF HEXANE	1.57	7.46×10^{-02}	1.01×10^{-01}	7.37×10^{-01}	2.48

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
ISOMERS OF NONANE	5.51×10^{-01}	2.63×10^{-02}	3.56×10^{-02}	2.59×10^{-01}	8.72×10^{-01}
ISOMERS OF OCTADECANE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
ISOMERS OF OCTANE	4.35×10^{-01}	2.07×10^{-02}	2.81×10^{-02}	2.05×10^{-01}	6.89×10^{-01}
ISOMERS OF PENTADECANE	1.22	5.80×10^{-02}	7.86×10^{-02}	5.73×10^{-01}	1.93
ISOMERS OF PENTANE	3.22	1.53×10^{-01}	2.08×10^{-01}	1.51	5.10
ISOMERS OF PENTENE	1.45×10^{-01}	6.91×10^{-03}	9.36×10^{-03}	6.82×10^{-02}	2.30×10^{-01}
ISOMERS OF PROPYLBENZENE	5.80×10^{-02}	2.76×10^{-03}	3.74×10^{-03}	2.73×10^{-02}	9.18×10^{-02}
ISOMERS OF TETRADECANE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
ISOMERS OF UNDECANE	1.45×10^{-01}	6.91×10^{-03}	9.36×10^{-03}	6.82×10^{-02}	2.30×10^{-01}
ISOMERS OF XYLENE	$1.70 \times 10^{+02}$	8.08	$1.10 \times 10^{+01}$	$7.98 \times 10^{+01}$	$2.69 \times 10^{+02}$
ISOPENTANE	$7.00 \times 10^{+01}$	3.34	4.52	$3.29 \times 10^{+01}$	$1.11 \times 10^{+02}$
ISOPRENE	3.39	1.62×10^{-01}	2.19×10^{-01}	1.59	5.37
ISOPROPYL ACETATE	1.36	6.49×10^{-02}	8.80×10^{-02}	6.41×10^{-01}	2.16
ISOPROPYL ALCOHOL	2.12	1.01×10^{-01}	1.37×10^{-01}	9.96×10^{-01}	3.35
ISOPROPYLBENZENE	1.10	5.25×10^{-02}	7.11×10^{-02}	5.18×10^{-01}	1.74
LACTOL SPIRITS	1.04	4.97×10^{-02}	6.74×10^{-02}	4.91×10^{-01}	1.65
MALEIC ANHYDRIDE	2.03×10^{-01}	9.67×10^{-03}	1.31×10^{-02}	9.55×10^{-02}	3.21×10^{-01}
MANGANESE AND COMPOUNDS	6.71×10^{-02}	3.19×10^{-03}	4.33×10^{-03}	3.15×10^{-02}	1.06×10^{-01}
M-DIETHYLBENZENE	$1.14 \times 10^{+01}$	5.42×10^{-01}	7.34×10^{-01}	5.35	$1.80 \times 10^{+01}$
METHANE	$2.16 \times 10^{+02}$	$1.03 \times 10^{+01}$	$1.39 \times 10^{+01}$	$1.01 \times 10^{+02}$	$3.41 \times 10^{+02}$
METHYL ACETATE	2.06	9.81×10^{-02}	1.33×10^{-01}	9.68×10^{-01}	3.26
METHYL ACRYLATE	1.10	5.25×10^{-02}	7.11×10^{-02}	5.18×10^{-01}	1.74
METHYL ALCOHOL	4.06	1.93×10^{-01}	2.62×10^{-01}	1.91	6.43
METHYL AMYL KETONE	1.48	7.05×10^{-02}	9.55×10^{-02}	6.96×10^{-01}	2.34
METHYL CARBITOL	1.13	5.39×10^{-02}	7.30×10^{-02}	5.32×10^{-01}	1.79
METHYL CELLOSOLVE	1.13	5.39×10^{-02}	7.30×10^{-02}	5.32×10^{-01}	1.79
METHYL ETHYL KETONE	3.54	1.69×10^{-01}	2.28×10^{-01}	1.66	5.60
METHYL FORMATE	6.09×10^{-01}	2.90×10^{-02}	3.93×10^{-02}	2.86×10^{-01}	9.64×10^{-01}
METHYL GLYOXAL	5.80×10^{-02}	2.76×10^{-03}	3.74×10^{-03}	2.73×10^{-02}	9.18×10^{-02}
METHYL ISOBUTYL KETONE	1.63	7.74×10^{-02}	1.05×10^{-01}	7.64×10^{-01}	2.57
METHYL METHACRYLATE	1.33	6.36×10^{-02}	8.61×10^{-02}	6.27×10^{-01}	2.11
METHYL MYRISTATE	8.71×10^{-02}	4.15×10^{-03}	5.62×10^{-03}	4.09×10^{-02}	1.38×10^{-01}
METHYL NAPHTHALENES	1.16×10^{-01}	5.53×10^{-03}	7.49×10^{-03}	5.46×10^{-02}	1.84×10^{-01}
METHYL PALMITATE	2.32×10^{-01}	1.11×10^{-02}	1.50×10^{-02}	1.09×10^{-01}	3.67×10^{-01}
METHYL STEARATE	3.19×10^{-01}	1.52×10^{-02}	2.06×10^{-02}	1.50×10^{-01}	5.05×10^{-01}
METHYL STYRENE	1.19	5.67×10^{-02}	7.68×10^{-02}	5.59×10^{-01}	1.88
METHYL TERT-BUTYL ETHER	$1.72 \times 10^{+02}$	8.18	$1.11 \times 10^{+01}$	$8.08 \times 10^{+01}$	$2.72 \times 10^{+02}$
METHYLACETYLENE	3.39	1.62×10^{-01}	2.19×10^{-01}	1.59	5.37
METHYLAL	4.93×10^{-01}	2.35×10^{-02}	3.18×10^{-02}	2.32×10^{-01}	7.81×10^{-01}
METHYLALLENE	1.16	5.53×10^{-02}	7.49×10^{-02}	5.46×10^{-01}	1.84
METHYLCYCLOHEXANE	9.38	4.47×10^{-01}	6.05×10^{-01}	4.41	$1.48 \times 10^{+01}$
METHYLCYCLOPENTANE	$1.22 \times 10^{+01}$	5.80×10^{-01}	7.85×10^{-01}	5.72	$1.93 \times 10^{+01}$
METHYLCYCLOPENTENE	3.99×10^{-01}	1.90×10^{-02}	2.58×10^{-02}	1.88×10^{-01}	6.32×10^{-01}
METHYLDECANES	5.80×10^{-02}	2.76×10^{-03}	3.74×10^{-03}	2.73×10^{-02}	9.18×10^{-02}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
METHYLENE BROMIDE	8.71×10^{-02}	4.15×10^{-03}	5.62×10^{-03}	4.09×10^{-02}	1.38×10^{-01}
METHYLHEXANE	8.71×10^{-02}	4.15×10^{-03}	5.62×10^{-03}	4.09×10^{-02}	1.38×10^{-01}
METHYLNONANE	5.80×10^{-02}	2.76×10^{-03}	3.74×10^{-03}	2.73×10^{-02}	9.18×10^{-02}
METHYLOCTANES	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
METHYLPENTANE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
METHYLPROPYLCYCLOHEXANES	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
M-ETHYLTOLUENE	$2.49 \times 10^{+01}$	1.19	1.61	$1.17 \times 10^{+01}$	$3.95 \times 10^{+01}$
METHYLUNDECANE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
MINERAL SPIRITS	1.86	8.84×10^{-02}	1.20×10^{-01}	8.73×10^{-01}	2.94
MYRCENE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
NAPHTHA	1.36	6.49×10^{-02}	8.80×10^{-02}	6.41×10^{-01}	2.16
NAPHTHALENE	2.92	1.39×10^{-01}	1.88×10^{-01}	1.37	4.62
N-BUTANE	$7.60 \times 10^{+01}$	3.62	4.91	$3.57 \times 10^{+01}$	$1.20 \times 10^{+02}$
N-BUTYL ACETATE	1.68	8.01×10^{-02}	1.09×10^{-01}	7.91×10^{-01}	2.66
N-BUTYL ALCOHOL	2.00	9.53×10^{-02}	1.29×10^{-01}	9.41×10^{-01}	3.17
N-DECANE	3.99	1.90×10^{-01}	2.58×10^{-01}	1.88	6.32
N-DODECANE	5.51×10^{-01}	2.63×10^{-02}	3.56×10^{-02}	2.59×10^{-01}	8.72×10^{-01}
N-HEPTANE	$1.06 \times 10^{+01}$	5.04×10^{-01}	6.82×10^{-01}	4.97	$1.67 \times 10^{+01}$
N-HEXANE	$3.34 \times 10^{+01}$	1.59	2.16	$1.57 \times 10^{+01}$	$5.29 \times 10^{+01}$
NICKEL AND COMPOUNDS	6.71×10^{-02}	3.19×10^{-03}	4.33×10^{-03}	3.15×10^{-02}	1.06×10^{-01}
NITRIC OXIDE	$3.76 \times 10^{+01}$	1.79	2.43	$1.77 \times 10^{+01}$	$5.95 \times 10^{+01}$
NITROBENZENE	9.58×10^{-01}	4.56×10^{-02}	6.18×10^{-02}	4.50×10^{-01}	1.52
NITROGEN DIOXIDE	3.03	1.44×10^{-01}	1.96×10^{-01}	1.43	4.80
N-NONANE	4.99	2.38×10^{-01}	3.22×10^{-01}	2.35	7.89
N-OCTANE	5.99	2.85×10^{-01}	3.86×10^{-01}	2.81	9.47
NONENONE	5.80×10^{-02}	2.76×10^{-03}	3.74×10^{-03}	2.73×10^{-02}	9.18×10^{-02}
N-PENTADECANE	4.93×10^{-01}	2.35×10^{-02}	3.18×10^{-02}	2.32×10^{-01}	7.81×10^{-01}
N-PENTANE	$3.19 \times 10^{+01}$	1.52	2.06	$1.50 \times 10^{+01}$	$5.05 \times 10^{+01}$
N-PENTYLCYCLOHEXANE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
N-PROPYL ACETATE	1.42	6.77×10^{-02}	9.17×10^{-02}	6.68×10^{-01}	2.25
N-PROPYL ALCOHOL	1.22	5.80×10^{-02}	7.86×10^{-02}	5.73×10^{-01}	1.93
N-PROPYLBENZENE	$1.12 \times 10^{+01}$	5.32×10^{-01}	7.21×10^{-01}	5.25	$1.77 \times 10^{+01}$
N-TETRADECANE	2.03×10^{-01}	9.67×10^{-03}	1.31×10^{-02}	9.55×10^{-02}	3.21×10^{-01}
N-TRIDECANE	2.90×10^{-01}	1.38×10^{-02}	1.87×10^{-02}	1.36×10^{-01}	4.59×10^{-01}
N-UNDECANE	$1.20 \times 10^{+01}$	5.70×10^{-01}	7.73×10^{-01}	5.63	$1.89 \times 10^{+01}$
OCTAMETHYLCYCLOTETRASILOXANE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
O-DICHLOROBENZENE	1.16	5.53×10^{-02}	7.49×10^{-02}	5.46×10^{-01}	1.84
O-ETHYLTOLUENE	5.19	2.47×10^{-01}	3.35×10^{-01}	2.44	8.21
OXIDES OF NITROGEN	$6.07 \times 10^{+01}$	2.89	3.91	$2.85 \times 10^{+01}$	$9.60 \times 10^{+01}$
PALMITIC ACID	5.80×10^{-01}	2.76×10^{-02}	3.74×10^{-02}	2.73×10^{-01}	9.18×10^{-01}
PARAFFINS (C16-C34)	5.80×10^{-02}	2.76×10^{-03}	3.74×10^{-03}	2.73×10^{-02}	9.18×10^{-02}
PARTICULATE MATTER < 10 µm	$1.34 \times 10^{+02}$	6.39	8.65	$6.30 \times 10^{+01}$	$2.12 \times 10^{+02}$
PARTICULATE MATTER < 2.5 µm	$1.23 \times 10^{+02}$	5.88	7.96	$5.80 \times 10^{+01}$	$1.95 \times 10^{+02}$
P-DICHLOROBENZENE	2.09	9.95×10^{-02}	1.35×10^{-01}	9.82×10^{-01}	3.31

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
PHENANTHRENE	2.05×10^{-01}	9.76×10^{-03}	1.32×10^{-02}	9.63×10^{-02}	3.24×10^{-01}
PHENOL	1.28	6.08×10^{-02}	8.24×10^{-02}	6.00×10^{-01}	2.02
PHENYL ISOCYANATE	3.48×10^{-01}	1.66×10^{-02}	2.25×10^{-02}	1.64×10^{-01}	5.51×10^{-01}
PHTHALIC ANHYDRIDE	5.80×10^{-01}	2.76×10^{-02}	3.74×10^{-02}	2.73×10^{-01}	9.18×10^{-01}
PIPERYLENE	1.16	5.53×10^{-02}	7.49×10^{-02}	5.46×10^{-01}	1.84
POLYCHLORINATED DIOXINS AND FURANS	8.38×10^{-12}	3.99×10^{-13}	5.40×10^{-13}	3.94×10^{-12}	1.33×10^{-11}
POLYCYCLIC AROMATIC HYDROCARBONS	4.75	2.26×10^{-01}	3.07×10^{-01}	2.23	7.52
PROPADIENE	2.59	1.24×10^{-01}	1.67×10^{-01}	1.22	4.10
PROPANE	6.96	3.32×10^{-01}	4.49×10^{-01}	3.27	$1.10 \times 10^{+01}$
PROPIONALDEHYDE	1.49×10^{-01}	7.09×10^{-03}	9.61×10^{-03}	7.00×10^{-02}	2.36×10^{-01}
PROPIONIC ACID	1.16	5.53×10^{-02}	7.49×10^{-02}	5.46×10^{-01}	1.84
PROPYLCYCLOHEXANE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
PROPYLENE	$5.75 \times 10^{+01}$	2.74	3.71	$2.70 \times 10^{+01}$	$9.09 \times 10^{+01}$
PROPYLENE DICHLORIDE	5.80×10^{-02}	2.76×10^{-03}	3.74×10^{-03}	2.73×10^{-02}	9.18×10^{-02}
PROPYLENE GLYCOL	1.10	5.25×10^{-02}	7.11×10^{-02}	5.18×10^{-01}	1.74
PROPYLENE OXIDE	1.45	6.91×10^{-02}	9.36×10^{-02}	6.82×10^{-01}	2.30
PYRENE	3.32×10^{-01}	1.58×10^{-02}	2.14×10^{-02}	1.56×10^{-01}	5.26×10^{-01}
RETENE	9.77×10^{-02}	4.65×10^{-03}	6.30×10^{-03}	4.59×10^{-02}	1.55×10^{-01}
S-BUTYL ALCOHOL	9.87×10^{-01}	4.70×10^{-02}	6.37×10^{-02}	4.64×10^{-01}	1.56
S-BUTYLBENZENE	3.39	1.62×10^{-01}	2.19×10^{-01}	1.59	5.37
STYRENE	2.42	1.15×10^{-01}	1.56×10^{-01}	1.14	3.82
SUBSTITUTED C9 ESTER (C12)	2.61×10^{-01}	1.24×10^{-02}	1.68×10^{-02}	1.23×10^{-01}	4.13×10^{-01}
SULFUR DIOXIDE	5.80	2.76×10^{-01}	3.75×10^{-01}	2.73	9.18
T-3-HEXENE	3.99	1.90×10^{-01}	2.58×10^{-01}	1.88	6.32
TERT-BUTYL ALCOHOL	1.22	5.80×10^{-02}	7.86×10^{-02}	5.73×10^{-01}	1.93
TETRACHLOROETHYLENE	2.03	9.67×10^{-02}	1.31×10^{-01}	9.55×10^{-01}	3.21
TETRAFLUOROMETHANE	8.71×10^{-02}	4.15×10^{-03}	5.62×10^{-03}	4.09×10^{-02}	1.38×10^{-01}
TOLUENE	$1.33 \times 10^{+02}$	6.34	8.59	$6.26 \times 10^{+01}$	$2.11 \times 10^{+02}$
TOLUENE DIISOCYANATE	1.92	9.12×10^{-02}	1.24×10^{-01}	9.00×10^{-01}	3.03
TOTAL AROMATIC AMINES	1.16×10^{-01}	5.53×10^{-03}	7.49×10^{-03}	5.46×10^{-02}	1.84×10^{-01}
TOTAL C2-C5 ALDEHYDES	3.48×10^{-01}	1.66×10^{-02}	2.25×10^{-02}	1.64×10^{-01}	5.51×10^{-01}
TOTAL SUSPENDED PARTICULATES	$1.41 \times 10^{+02}$	6.72	9.11	$6.64 \times 10^{+01}$	$2.23 \times 10^{+02}$
TOTAL VOCS	$2.10 \times 10^{+03}$	$1.00 \times 10^{+02}$	$1.36 \times 10^{+02}$	$9.87 \times 10^{+02}$	$3.32 \times 10^{+03}$
TRANS-2-BUTENE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
TRANS-2-PENTENE	6.79	3.23×10^{-01}	4.38×10^{-01}	3.19	$1.07 \times 10^{+01}$
TRICHLOROBENZENES	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
TRICHLOROETHYLENE	1.25	5.94×10^{-02}	8.05×10^{-02}	5.87×10^{-01}	1.97
TRICHLOROFLUOROMETHANE	1.77	8.43×10^{-02}	1.14×10^{-01}	8.32×10^{-01}	2.80
TRICHLOROTRIFLUOROETHANE	1.16	5.53×10^{-02}	7.49×10^{-02}	5.46×10^{-01}	1.84
TRIFLUOROMETHANE	8.71×10^{-01}	4.15×10^{-02}	5.62×10^{-02}	4.09×10^{-01}	1.38
TRIMETHYLBENZENE	3.19×10^{-01}	1.52×10^{-02}	2.06×10^{-02}	1.50×10^{-01}	5.05×10^{-01}
TRIMETHYLCYCLOHEXANES	5.80×10^{-02}	2.76×10^{-03}	3.74×10^{-03}	2.73×10^{-02}	9.18×10^{-02}
TRIMETHYLCYCLOPENTANE	2.90×10^{-02}	1.38×10^{-03}	1.87×10^{-03}	1.36×10^{-02}	4.59×10^{-02}
TRIMETHYLDECENE	5.80×10^{-02}	2.76×10^{-03}	3.74×10^{-03}	2.73×10^{-02}	9.18×10^{-02}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
TRIMETHYLFLUOROSILANE	2.00	9.53×10^{-02}	1.29×10^{-01}	9.41×10^{-01}	3.17
TRIMETHYLHEPTANES	5.80×10^{-02}	2.76×10^{-03}	3.74×10^{-03}	2.73×10^{-02}	9.18×10^{-02}
VINYL ACETATE	1.60	7.60×10^{-02}	1.03×10^{-01}	7.50×10^{-01}	2.53
VINYL CHLORIDE	1.22	5.80×10^{-02}	7.86×10^{-02}	5.73×10^{-01}	1.93
ZINC AND COMPOUNDS	6.71×10^{-02}	3.19×10^{-03}	4.33×10^{-03}	3.15×10^{-02}	1.06×10^{-01}

Table C1.24: Annual Emissions from Recreational Boats – 4-Stroke Petrol

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
1,1,1-TRICHLOROETHANE	9.14×10^{-02}	4.35×10^{-03}	5.89×10^{-03}	4.29×10^{-02}	1.45×10^{-01}
1,1,2-TRICHLOROETHANE	7.44×10^{-02}	3.54×10^{-03}	4.80×10^{-03}	3.50×10^{-02}	1.18×10^{-01}
1,2,3-TRIMETHYLBENZENE	1.18	5.64×10^{-02}	7.64×10^{-02}	5.56×10^{-01}	1.87
1,2,4-TRIMETHYLBENZENE	4.24	2.02×10^{-01}	2.73×10^{-01}	1.99	6.70
1,2-DIETHYLBENZENE	9.79×10^{-01}	4.66×10^{-02}	6.32×10^{-02}	4.60×10^{-01}	1.55
1,3,5-TRIMETHYLBENZENE	3.23	1.54×10^{-01}	2.08×10^{-01}	1.52	5.11
1,3-BUTADIENE	1.66	7.93×10^{-02}	1.07×10^{-01}	7.82×10^{-01}	2.63
1,4-BUTANEDIOL	8.50×10^{-03}	4.05×10^{-04}	5.48×10^{-04}	3.99×10^{-03}	1.34×10^{-02}
1-BUTENE	8.50×10^{-02}	4.05×10^{-03}	5.48×10^{-03}	3.99×10^{-02}	1.34×10^{-01}
1-BUTYNE	4.25×10^{-03}	2.02×10^{-04}	2.74×10^{-04}	2.00×10^{-03}	6.72×10^{-03}
1-CHLOROBUTANE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
1-DECENE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
1-HEXENE	3.21×10^{-01}	1.53×10^{-02}	2.07×10^{-02}	1.51×10^{-01}	5.09×10^{-01}
1-METHYL-3-ISOPROPYLBENZENE	7.45×10^{-01}	3.55×10^{-02}	4.81×10^{-02}	3.50×10^{-01}	1.18
1-METHYL-3-PROPYLBENZENE	5.70×10^{-01}	2.71×10^{-02}	3.68×10^{-02}	2.68×10^{-01}	9.02×10^{-01}
1-PENTENE	2.78×10^{-01}	1.32×10^{-02}	1.79×10^{-02}	1.30×10^{-01}	4.39×10^{-01}
2,2,4-TRIMETHYLPENTANE	4.42	2.11×10^{-01}	2.85×10^{-01}	2.08	7.00
2,2,5-TRIMETHYLHEXANE	7.01×10^{-01}	3.34×10^{-02}	4.52×10^{-02}	3.30×10^{-01}	1.11
2,2-DICHLORONITROANILINE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
2,2-DIMETHYLBUTANE	1.04	4.94×10^{-02}	6.69×10^{-02}	4.88×10^{-01}	1.64
2,2-DIMETHYLHEXANE	1.02×10^{-01}	4.87×10^{-03}	6.60×10^{-03}	4.81×10^{-02}	1.62×10^{-01}
2,3,3-TRIMETHYLPENTANE	1.61	7.65×10^{-02}	1.04×10^{-01}	7.55×10^{-01}	2.54
2,3,4-TRIMETHYLPENTANE	1.61×10^{-01}	7.65×10^{-03}	1.04×10^{-02}	7.55×10^{-02}	2.54×10^{-01}
2,3,5-TRIMETHYLHEXANE	1.61×10^{-01}	7.65×10^{-03}	1.04×10^{-02}	7.55×10^{-02}	2.54×10^{-01}
2,3-DIMETHYLBUTANE	7.74×10^{-01}	3.69×10^{-02}	5.00×10^{-02}	3.64×10^{-01}	1.23
2,3-DIMETHYLPENTANE	1.83	8.70×10^{-02}	1.18×10^{-01}	8.58×10^{-01}	2.89
2,4,4-TRIMETHYL-1-PENTENE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
2,4,5-TRIMETHYLHEPTANE	6.57×10^{-01}	3.13×10^{-02}	4.24×10^{-02}	3.09×10^{-01}	1.04
2,4-DIMETHYLHEPTANE	1.90×10^{-01}	9.04×10^{-03}	1.23×10^{-02}	8.93×10^{-02}	3.01×10^{-01}
2,4-DIMETHYLHEXANE	1.27×10^{-02}	6.07×10^{-04}	8.22×10^{-04}	5.99×10^{-03}	2.02×10^{-02}
2,4-DIMETHYLOCTANE	1.46×10^{-01}	6.96×10^{-03}	9.43×10^{-03}	6.87×10^{-02}	2.31×10^{-01}
2,4-DIMETHYLPENTANE	7.74×10^{-01}	3.69×10^{-02}	5.00×10^{-02}	3.64×10^{-01}	1.23
2,5-DIMETHYLHEXANE	9.20×10^{-01}	4.38×10^{-02}	5.94×10^{-02}	4.33×10^{-01}	1.46
2-BUTYNE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
2-FURFURAL	7.86×10^{-02}	3.74×10^{-03}	5.07×10^{-03}	3.69×10^{-02}	1.24×10^{-01}
2-HEXENE	1.17×10^{-01}	5.57×10^{-03}	7.54×10^{-03}	5.49×10^{-02}	1.85×10^{-01}
2-METHYL-1-BUTENE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
2-METHYL-2-BUTENE	7.45×10^{-01}	3.55×10^{-02}	4.81×10^{-02}	3.50×10^{-01}	1.18
2-METHYL-2-PENTENE	3.36×10^{-01}	1.60×10^{-02}	2.17×10^{-02}	1.58×10^{-01}	5.32×10^{-01}
2-METHYL-3-HEXANONE	1.49×10^{-02}	7.08×10^{-04}	9.59×10^{-04}	6.99×10^{-03}	2.35×10^{-02}
2-METHYLDECANE	1.93	9.18×10^{-02}	1.24×10^{-01}	9.07×10^{-01}	3.05
2-METHYLHEPTANE	3.21×10^{-01}	1.53×10^{-02}	2.07×10^{-02}	1.51×10^{-01}	5.09×10^{-01}
2-METHYLOCTANE	2.92×10^{-02}	1.39×10^{-03}	1.89×10^{-03}	1.37×10^{-02}	4.62×10^{-02}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
2-METHYLPENTANE	1.86	8.84×10^{-02}	1.20×10^{-01}	8.72×10^{-01}	2.94
3,4-DIMETHYLOCTANE	1.40	6.68×10^{-02}	9.05×10^{-02}	6.59×10^{-01}	2.22
3-METHYL-1-BUTENE	2.63×10^{-01}	1.25×10^{-02}	1.70×10^{-02}	1.24×10^{-01}	4.16×10^{-01}
3-METHYLHEPTANE	5.26×10^{-01}	2.50×10^{-02}	3.39×10^{-02}	2.47×10^{-01}	8.32×10^{-01}
3-METHYLHEXANE	1.34	6.40×10^{-02}	8.67×10^{-02}	6.32×10^{-01}	2.13
3-METHYLPENTANE	1.26	5.98×10^{-02}	8.11×10^{-02}	5.91×10^{-01}	1.99
4-METHYL-1-PENTENE	3.65×10^{-01}	1.74×10^{-02}	2.36×10^{-02}	1.72×10^{-01}	5.78×10^{-01}
4-METHYLANILINE	6.37×10^{-03}	3.04×10^{-04}	4.11×10^{-04}	3.00×10^{-03}	1.01×10^{-02}
4-METHYLHEPTANE	7.60×10^{-01}	3.62×10^{-02}	4.90×10^{-02}	3.57×10^{-01}	1.20
ACENAPHTHENE	1.36×10^{-02}	6.49×10^{-04}	8.80×10^{-04}	6.41×10^{-03}	2.16×10^{-02}
ACENAPHTHYLENE	5.56×10^{-02}	2.65×10^{-03}	3.58×10^{-03}	2.61×10^{-02}	8.79×10^{-02}
ACETALDEHYDE	1.80×10^{-01}	8.55×10^{-03}	1.16×10^{-02}	8.44×10^{-02}	2.84×10^{-01}
ACETIC ACID	1.55×10^{-01}	7.39×10^{-03}	1.00×10^{-02}	7.29×10^{-02}	2.45×10^{-01}
ACETIC ANHYDRIDE	7.44×10^{-02}	3.54×10^{-03}	4.80×10^{-03}	3.50×10^{-02}	1.18×10^{-01}
ACETONE	3.12×10^{-01}	1.49×10^{-02}	2.01×10^{-02}	1.47×10^{-01}	4.94×10^{-01}
ACETYLENE	3.29	1.57×10^{-01}	2.12×10^{-01}	1.55	5.20
ACROLEIN	2.25×10^{-02}	1.07×10^{-03}	1.45×10^{-03}	1.06×10^{-02}	3.56×10^{-02}
ACRYLIC ACID	9.56×10^{-02}	4.55×10^{-03}	6.17×10^{-03}	4.49×10^{-02}	1.51×10^{-01}
ACRYLONITRILE	1.23×10^{-01}	5.87×10^{-03}	7.95×10^{-03}	5.79×10^{-02}	1.95×10^{-01}
ADIPIC ACID	8.50×10^{-02}	4.05×10^{-03}	5.48×10^{-03}	3.99×10^{-02}	1.34×10^{-01}
ALIPHATICS	2.12×10^{-02}	1.01×10^{-03}	1.37×10^{-03}	9.99×10^{-03}	3.36×10^{-02}
ALKENE KETONE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
ALPHA-PINENE	7.44×10^{-02}	3.54×10^{-03}	4.80×10^{-03}	3.50×10^{-02}	1.18×10^{-01}
ANILINE	1.68×10^{-01}	7.99×10^{-03}	1.08×10^{-02}	7.89×10^{-02}	2.66×10^{-01}
ANTHRACENE	1.49×10^{-02}	7.10×10^{-04}	9.62×10^{-04}	7.01×10^{-03}	2.36×10^{-02}
ANTHRAQUINONE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
BENZALDEHYDE	3.51×10^{-01}	1.67×10^{-02}	2.26×10^{-02}	1.65×10^{-01}	5.55×10^{-01}
BENZENE	6.59	3.14×10^{-01}	4.25×10^{-01}	3.10	$1.04 \times 10^{+01}$
BENZO(A)ANTHRACENE	3.79×10^{-03}	1.80×10^{-04}	2.44×10^{-04}	1.78×10^{-03}	6.00×10^{-03}
BENZO(A)PYRENE	7.07×10^{-03}	3.37×10^{-04}	4.56×10^{-04}	3.32×10^{-03}	1.12×10^{-02}
BENZO(B)FLUORANTHENE	4.32×10^{-03}	2.06×10^{-04}	2.78×10^{-04}	2.03×10^{-03}	6.83×10^{-03}
BENZO(E)PYRENE	2.45×10^{-02}	1.17×10^{-03}	1.58×10^{-03}	1.15×10^{-02}	3.88×10^{-02}
BENZO(G,H,I,)PERYLENE	3.35×10^{-03}	1.60×10^{-04}	2.16×10^{-04}	1.57×10^{-03}	5.30×10^{-03}
BENZO(K)FLUORANTHENE	3.64×10^{-03}	1.73×10^{-04}	2.35×10^{-04}	1.71×10^{-03}	5.76×10^{-03}
BENZOIC ACID	8.50×10^{-03}	4.05×10^{-04}	5.48×10^{-04}	3.99×10^{-03}	1.34×10^{-02}
BENZYL CHLORIDE	8.92×10^{-02}	4.25×10^{-03}	5.76×10^{-03}	4.19×10^{-02}	1.41×10^{-01}
BETA-PINENE	4.89×10^{-02}	2.33×10^{-03}	3.15×10^{-03}	2.30×10^{-02}	7.73×10^{-02}
BIPHENYL	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
B-PHELLANDRENE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
BROMODINITROBENZENE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
BUTOXYBUTENE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
BUTOXYETHOXYETHANOL ACETATE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
BUTYL ACRYLATE	9.14×10^{-02}	4.35×10^{-03}	5.89×10^{-03}	4.29×10^{-02}	1.45×10^{-01}
BUTYL BENZOATE	4.46×10^{-02}	2.12×10^{-03}	2.88×10^{-03}	2.10×10^{-02}	7.06×10^{-02}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
BUTYL CARBITOL	8.29×10^{-02}	3.95×10^{-03}	5.35×10^{-03}	3.89×10^{-02}	1.31×10^{-01}
BUTYL CELLOSOLVE	9.35×10^{-02}	4.45×10^{-03}	6.03×10^{-03}	4.39×10^{-02}	1.48×10^{-01}
BUTYLCYCLOHEXANE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
BUTYLISOPROPYLPHTHALATE	1.06×10^{-02}	5.06×10^{-04}	6.85×10^{-04}	4.99×10^{-03}	1.68×10^{-02}
BUTYRALDEHYDE	9.35×10^{-02}	4.45×10^{-03}	6.03×10^{-03}	4.39×10^{-02}	1.48×10^{-01}
C10 AROMATIC	3.87	1.84×10^{-01}	2.50×10^{-01}	1.82	6.13
C10 OLEFINS	6.37×10^{-03}	3.04×10^{-04}	4.11×10^{-04}	3.00×10^{-03}	1.01×10^{-02}
C10 PARAFFINS	2.78×10^{-01}	1.32×10^{-02}	1.79×10^{-02}	1.30×10^{-01}	4.39×10^{-01}
C2 ALKYL INDAN	8.50×10^{-03}	4.05×10^{-04}	5.48×10^{-04}	3.99×10^{-03}	1.34×10^{-02}
C2 CYCLOHEXANE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
C3 CYCLOHEXANE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
C3/C4/C5 ALKYLBENZENES	6.37×10^{-03}	3.04×10^{-04}	4.11×10^{-04}	3.00×10^{-03}	1.01×10^{-02}
C-3-HEXENE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
C4 SUBSTITUTED CYCLOHEXANE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
C4 SUBSTITUTED CYCLOHEXANONE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
C5 ESTER	4.25×10^{-03}	2.02×10^{-04}	2.74×10^{-04}	2.00×10^{-03}	6.72×10^{-03}
C5 OLEFIN	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
C5 PARAFFIN	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
C5 SUBSTITUTED CYCLOHEXANE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
C6 SUBSTITUTED CYCLOHEXANE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
C6H18O3SI3	1.91×10^{-02}	9.11×10^{-04}	1.23×10^{-03}	8.99×10^{-03}	3.03×10^{-02}
C-7 CYCLOPARAFFINS	1.51×10^{-01}	7.18×10^{-03}	9.73×10^{-03}	7.09×10^{-02}	2.39×10^{-01}
C7-C16 PARAFFINS	3.19×10^{-02}	1.52×10^{-03}	2.06×10^{-03}	1.50×10^{-02}	5.04×10^{-02}
C-8 CYCLOPARAFFINS	1.06×10^{-02}	5.06×10^{-04}	6.85×10^{-04}	4.99×10^{-03}	1.68×10^{-02}
C8 PARAFFIN	4.25×10^{-03}	2.02×10^{-04}	2.74×10^{-04}	2.00×10^{-03}	6.72×10^{-03}
C8H24O4SI4	6.37×10^{-03}	3.04×10^{-04}	4.11×10^{-04}	3.00×10^{-03}	1.01×10^{-02}
CAMPHENE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
CARBITOL	9.77×10^{-02}	4.65×10^{-03}	6.31×10^{-03}	4.59×10^{-02}	1.55×10^{-01}
CARBON MONOXIDE	$9.11 \times 10^{+02}$	$4.34 \times 10^{+01}$	$5.87 \times 10^{+01}$	$4.28 \times 10^{+02}$	$1.44 \times 10^{+03}$
CARBON SULFIDE	1.91×10^{-02}	9.11×10^{-04}	1.23×10^{-03}	8.99×10^{-03}	3.03×10^{-02}
CARBON TETRACHLORIDE	1.38×10^{-01}	6.58×10^{-03}	8.91×10^{-03}	6.49×10^{-02}	2.18×10^{-01}
CARBONYL SULFIDE	6.37×10^{-03}	3.04×10^{-04}	4.11×10^{-04}	3.00×10^{-03}	1.01×10^{-02}
CELLOSOLVE	7.65×10^{-02}	3.64×10^{-03}	4.93×10^{-03}	3.60×10^{-02}	1.21×10^{-01}
CELLOSOLVE ACETATE	7.65×10^{-02}	3.64×10^{-03}	4.93×10^{-03}	3.60×10^{-02}	1.21×10^{-01}
CHLOROBENZENE	1.51×10^{-01}	7.18×10^{-03}	9.73×10^{-03}	7.09×10^{-02}	2.39×10^{-01}
CHLORODIFLUOROMETHANE	3.40×10^{-02}	1.62×10^{-03}	2.19×10^{-03}	1.60×10^{-02}	5.38×10^{-02}
CHLOROFORM	1.08×10^{-01}	5.16×10^{-03}	6.99×10^{-03}	5.09×10^{-02}	1.71×10^{-01}
CHLOROPENTAFLUOROETHANE	4.25×10^{-03}	2.02×10^{-04}	2.74×10^{-04}	2.00×10^{-03}	6.72×10^{-03}
CHLOROPRENE	7.22×10^{-02}	3.44×10^{-03}	4.66×10^{-03}	3.40×10^{-02}	1.14×10^{-01}
CHLOROTRIFLUOROMETHANE	1.06×10^{-02}	5.06×10^{-04}	6.85×10^{-04}	4.99×10^{-03}	1.68×10^{-02}
CHROMIUM (III) COMPOUNDS	3.98×10^{-03}	1.90×10^{-04}	2.57×10^{-04}	1.87×10^{-03}	6.30×10^{-03}
CHROMIUM (VI) COMPOUNDS	1.66×10^{-03}	7.90×10^{-05}	1.07×10^{-04}	7.80×10^{-04}	2.63×10^{-03}
CHRYSENE	3.66×10^{-03}	1.74×10^{-04}	2.36×10^{-04}	1.72×10^{-03}	5.79×10^{-03}
CIS-2-BUTENE	6.72×10^{-01}	3.20×10^{-02}	4.34×10^{-02}	3.16×10^{-01}	1.06

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
CIS-2-PENTENE	2.92×10^{-01}	1.39×10^{-02}	1.89×10^{-02}	1.37×10^{-01}	4.62×10^{-01}
COBALT AND COMPOUNDS	5.64×10^{-03}	2.69×10^{-04}	3.64×10^{-04}	2.65×10^{-03}	8.93×10^{-03}
COPPER AND COMPOUNDS	5.64×10^{-03}	2.69×10^{-04}	3.64×10^{-04}	2.65×10^{-03}	8.93×10^{-03}
CORONENE	6.41×10^{-04}	3.05×10^{-05}	4.14×10^{-05}	3.02×10^{-04}	1.01×10^{-03}
CREOSOTE	7.86×10^{-02}	3.74×10^{-03}	5.07×10^{-03}	3.69×10^{-02}	1.24×10^{-01}
CRESOL	8.07×10^{-02}	3.84×10^{-03}	5.21×10^{-03}	3.79×10^{-02}	1.28×10^{-01}
CROTONALDEHYDE	1.02×10^{-01}	4.87×10^{-03}	6.60×10^{-03}	4.81×10^{-02}	1.62×10^{-01}
CYCLOHEXANE	2.37	1.13×10^{-01}	1.53×10^{-01}	1.11	3.74
CYCLOHEXANOL	9.56×10^{-02}	4.55×10^{-03}	6.17×10^{-03}	4.49×10^{-02}	1.51×10^{-01}
CYCLOHEXANONE	1.13×10^{-01}	5.36×10^{-03}	7.26×10^{-03}	5.29×10^{-02}	1.78×10^{-01}
CYCLOHEXENE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
CYCLOPENTA(C,D)PYRENE	7.23×10^{-03}	3.44×10^{-04}	4.66×10^{-04}	3.40×10^{-03}	1.14×10^{-02}
CYCLOPENTANE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
CYCLOPENTENE	3.94×10^{-01}	1.88×10^{-02}	2.55×10^{-02}	1.85×10^{-01}	6.24×10^{-01}
DENATURANT	2.12×10^{-02}	1.01×10^{-03}	1.37×10^{-03}	9.99×10^{-03}	3.36×10^{-02}
DIBENZO(A,H)ANTHRACENE	3.53×10^{-03}	1.68×10^{-04}	2.28×10^{-04}	1.66×10^{-03}	5.58×10^{-03}
DIBUTYL PHTHALATE	8.50×10^{-03}	4.05×10^{-04}	5.48×10^{-04}	3.99×10^{-03}	1.34×10^{-02}
DICHLOROBENZENES	4.25×10^{-03}	2.02×10^{-04}	2.74×10^{-04}	2.00×10^{-03}	6.72×10^{-03}
DICHLORODIFLUOROMETHANE	7.44×10^{-02}	3.54×10^{-03}	4.80×10^{-03}	3.50×10^{-02}	1.18×10^{-01}
DICHLOROMETHANE	1.59×10^{-01}	7.59×10^{-03}	1.03×10^{-02}	7.49×10^{-02}	2.52×10^{-01}
DICHLOROTETRAFLUORETHANE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
DIETHYLCYCLOHEXANE	6.37×10^{-03}	3.04×10^{-04}	4.11×10^{-04}	3.00×10^{-03}	1.01×10^{-02}
DIETHYLENE GLYCOL	9.35×10^{-02}	4.45×10^{-03}	6.03×10^{-03}	4.39×10^{-02}	1.48×10^{-01}
DIISOPROPYL BENZENE	8.07×10^{-02}	3.84×10^{-03}	5.21×10^{-03}	3.79×10^{-02}	1.28×10^{-01}
DIMETHYL FORMAMIDE	7.65×10^{-02}	3.64×10^{-03}	4.93×10^{-03}	3.60×10^{-02}	1.21×10^{-01}
DIMETHYL PHTHALATE	1.27×10^{-02}	6.07×10^{-04}	8.22×10^{-04}	5.99×10^{-03}	2.02×10^{-02}
DIMETHYLCYCLOHEXANE	1.06×10^{-02}	5.06×10^{-04}	6.85×10^{-04}	4.99×10^{-03}	1.68×10^{-02}
DIMETHYLCYCLOPENTANE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
DIMETHYLETHER	2.38×10^{-01}	1.13×10^{-02}	1.54×10^{-02}	1.12×10^{-01}	3.76×10^{-01}
DIMETHYLHEXENE	1.90×10^{-01}	9.04×10^{-03}	1.23×10^{-02}	8.93×10^{-02}	3.01×10^{-01}
DIMETHYLOCTANES	6.37×10^{-03}	3.04×10^{-04}	4.11×10^{-04}	3.00×10^{-03}	1.01×10^{-02}
DIPROPYLENE GLYCOL	1.40×10^{-01}	6.68×10^{-03}	9.05×10^{-03}	6.59×10^{-02}	2.22×10^{-01}
D-LIMONENE	1.06×10^{-02}	5.06×10^{-04}	6.85×10^{-04}	4.99×10^{-03}	1.68×10^{-02}
DODECENE	1.06×10^{-01}	5.06×10^{-03}	6.85×10^{-03}	4.99×10^{-02}	1.68×10^{-01}
EPICHLOROHYDRIN	8.92×10^{-02}	4.25×10^{-03}	5.76×10^{-03}	4.19×10^{-02}	1.41×10^{-01}
ETHANE	2.62	1.25×10^{-01}	1.69×10^{-01}	1.23	4.14
ETHANOLAMINE	9.35×10^{-02}	4.45×10^{-03}	6.03×10^{-03}	4.39×10^{-02}	1.48×10^{-01}
ETHYL ACETATE	9.35×10^{-02}	4.45×10^{-03}	6.03×10^{-03}	4.39×10^{-02}	1.48×10^{-01}
ETHYL ACRYLATE	1.06×10^{-01}	5.06×10^{-03}	6.85×10^{-03}	4.99×10^{-02}	1.68×10^{-01}
ETHYL ALCOHOL	2.89×10^{-01}	1.38×10^{-02}	1.86×10^{-02}	1.36×10^{-01}	4.57×10^{-01}
ETHYL CHLORIDE	6.16×10^{-02}	2.93×10^{-03}	3.97×10^{-03}	2.90×10^{-02}	9.75×10^{-02}
ETHYL ETHER	1.32×10^{-01}	6.27×10^{-03}	8.50×10^{-03}	6.19×10^{-02}	2.08×10^{-01}
ETHYL MERCAPTAN	7.01×10^{-02}	3.34×10^{-03}	4.52×10^{-03}	3.30×10^{-02}	1.11×10^{-01}
ETHYL STYRENE	6.37×10^{-03}	3.04×10^{-04}	4.11×10^{-04}	3.00×10^{-03}	1.01×10^{-02}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
ETHYLBENZENE	5.51	2.62×10^{-01}	3.56×10^{-01}	2.59	8.72
ETHYLCYCLOHEXANE	4.25×10^{-03}	2.02×10^{-04}	2.74×10^{-04}	2.00×10^{-03}	6.72×10^{-03}
ETHYLCYCLOPENTANE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
ETHYLENE	$1.23 \times 10^{+01}$	5.85×10^{-01}	7.93×10^{-01}	5.78	$1.94 \times 10^{+01}$
ETHYLENE DIBROMIDE	8.92×10^{-02}	4.25×10^{-03}	5.76×10^{-03}	4.19×10^{-02}	1.41×10^{-01}
ETHYLENE DICHLORIDE	1.23×10^{-01}	5.87×10^{-03}	7.95×10^{-03}	5.79×10^{-02}	1.95×10^{-01}
ETHYLENE GLYCOL	7.86×10^{-02}	3.74×10^{-03}	5.07×10^{-03}	3.69×10^{-02}	1.24×10^{-01}
ETHYLENE OXIDE	8.07×10^{-02}	3.84×10^{-03}	5.21×10^{-03}	3.79×10^{-02}	1.28×10^{-01}
ETHYLENEAMINES	9.35×10^{-02}	4.45×10^{-03}	6.03×10^{-03}	4.39×10^{-02}	1.48×10^{-01}
ETHYLHEPTENE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
ETHYLHEXANE	4.25×10^{-03}	2.02×10^{-04}	2.74×10^{-04}	2.00×10^{-03}	6.72×10^{-03}
ETHYLISOPROPYL ETHER	4.25×10^{-03}	2.02×10^{-04}	2.74×10^{-04}	2.00×10^{-03}	6.72×10^{-03}
ETHYLMETHYLCYCLOHEXANES	4.25×10^{-03}	2.02×10^{-04}	2.74×10^{-04}	2.00×10^{-03}	6.72×10^{-03}
ETHYL-PHENYL-PHENYL-ETHANE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
ETHYLTOLUENE	4.25×10^{-03}	2.02×10^{-04}	2.74×10^{-04}	2.00×10^{-03}	6.72×10^{-03}
FLUORANTHENE	1.99×10^{-02}	9.46×10^{-04}	1.28×10^{-03}	9.34×10^{-03}	3.14×10^{-02}
FLUORENE	3.42×10^{-02}	1.63×10^{-03}	2.20×10^{-03}	1.61×10^{-02}	5.40×10^{-02}
FORMALDEHYDE	9.42×10^{-01}	4.49×10^{-02}	6.08×10^{-02}	4.43×10^{-01}	1.49
FORMIC ACID	8.92×10^{-02}	4.25×10^{-03}	5.76×10^{-03}	4.19×10^{-02}	1.41×10^{-01}
GLYOXAL	4.25×10^{-03}	2.02×10^{-04}	2.74×10^{-04}	2.00×10^{-03}	6.72×10^{-03}
HEPTENE	1.08×10^{-01}	5.16×10^{-03}	6.99×10^{-03}	5.09×10^{-02}	1.71×10^{-01}
HEXADECANE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
HEXAFLUOROETHANE	8.50×10^{-02}	4.05×10^{-03}	5.48×10^{-03}	3.99×10^{-02}	1.34×10^{-01}
HEXAMETHYLENEDIAMINE	1.42×10^{-01}	6.78×10^{-03}	9.18×10^{-03}	6.69×10^{-02}	2.25×10^{-01}
HEXYLENE GLYCOL	7.65×10^{-02}	3.64×10^{-03}	4.93×10^{-03}	3.60×10^{-02}	1.21×10^{-01}
INDANE	7.89×10^{-01}	3.76×10^{-02}	5.09×10^{-02}	3.71×10^{-01}	1.25
INDENO(1,2,3-C,D)PYRENE	9.03×10^{-04}	4.30×10^{-05}	5.83×10^{-05}	4.24×10^{-04}	1.43×10^{-03}
ISOBUTANE	9.06×10^{-01}	4.31×10^{-02}	5.84×10^{-02}	4.26×10^{-01}	1.43
ISOBUTYL ACRYLATE	8.07×10^{-02}	3.84×10^{-03}	5.21×10^{-03}	3.79×10^{-02}	1.28×10^{-01}
ISOBUTYL ALCOHOL	8.92×10^{-02}	4.25×10^{-03}	5.76×10^{-03}	4.19×10^{-02}	1.41×10^{-01}
ISOBUTYL ISOBUTYRATE	8.29×10^{-02}	3.95×10^{-03}	5.35×10^{-03}	3.89×10^{-02}	1.31×10^{-01}
ISOBUTYLBENZENE	7.16×10^{-01}	3.41×10^{-02}	4.62×10^{-02}	3.37×10^{-01}	1.13
ISOBUTYLENE	2.06	9.81×10^{-02}	1.33×10^{-01}	9.68×10^{-01}	3.26
ISOBUTYRALDEHYDE	8.92×10^{-02}	4.25×10^{-03}	5.76×10^{-03}	4.19×10^{-02}	1.41×10^{-01}
ISOMERS OF BUTENE	1.06×10^{-02}	5.06×10^{-04}	6.85×10^{-04}	4.99×10^{-03}	1.68×10^{-02}
ISOMERS OF BUTYLBENZENE	1.27×10^{-02}	6.07×10^{-04}	8.22×10^{-04}	5.99×10^{-03}	2.02×10^{-02}
ISOMERS OF C10H18	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
ISOMERS OF DECANE	8.50×10^{-02}	4.05×10^{-03}	5.48×10^{-03}	3.99×10^{-02}	1.34×10^{-01}
ISOMERS OF DIETHYLBENZENE	6.37×10^{-03}	3.04×10^{-04}	4.11×10^{-04}	3.00×10^{-03}	1.01×10^{-02}
ISOMERS OF DODECANE	9.77×10^{-02}	4.65×10^{-03}	6.31×10^{-03}	4.59×10^{-02}	1.55×10^{-01}
ISOMERS OF ETHYLTOLUENE	8.50×10^{-03}	4.05×10^{-04}	5.48×10^{-04}	3.99×10^{-03}	1.34×10^{-02}
ISOMERS OF HEPTADECANE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
ISOMERS OF HEPTANE	5.31×10^{-02}	2.53×10^{-03}	3.43×10^{-03}	2.50×10^{-02}	8.40×10^{-02}
ISOMERS OF HEXANE	1.15×10^{-01}	5.46×10^{-03}	7.40×10^{-03}	5.39×10^{-02}	1.82×10^{-01}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
ISOMERS OF NONANE	4.04×10^{-02}	1.92×10^{-03}	2.60×10^{-03}	1.90×10^{-02}	6.39×10^{-02}
ISOMERS OF OCTADECANE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
ISOMERS OF OCTANE	3.19×10^{-02}	1.52×10^{-03}	2.06×10^{-03}	1.50×10^{-02}	5.04×10^{-02}
ISOMERS OF PENTADECANE	8.92×10^{-02}	4.25×10^{-03}	5.76×10^{-03}	4.19×10^{-02}	1.41×10^{-01}
ISOMERS OF PENTANE	2.36×10^{-01}	1.12×10^{-02}	1.52×10^{-02}	1.11×10^{-01}	3.73×10^{-01}
ISOMERS OF PENTENE	1.06×10^{-02}	5.06×10^{-04}	6.85×10^{-04}	4.99×10^{-03}	1.68×10^{-02}
ISOMERS OF PROPYLBENZENE	4.25×10^{-03}	2.02×10^{-04}	2.74×10^{-04}	2.00×10^{-03}	6.72×10^{-03}
ISOMERS OF TETRADECANE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
ISOMERS OF UNDECANE	1.06×10^{-02}	5.06×10^{-04}	6.85×10^{-04}	4.99×10^{-03}	1.68×10^{-02}
ISOMERS OF XYLENE	$1.73 \times 10^{+01}$	8.24×10^{-01}	1.12	8.13	$2.74 \times 10^{+01}$
ISOPENTANE	5.13	2.44×10^{-01}	3.31×10^{-01}	2.41	8.11
ISOPRENE	2.48×10^{-01}	1.18×10^{-02}	1.60×10^{-02}	1.17×10^{-01}	3.93×10^{-01}
ISOPROPYL ACETATE	9.99×10^{-02}	4.75×10^{-03}	6.44×10^{-03}	4.69×10^{-02}	1.58×10^{-01}
ISOPROPYL ALCOHOL	1.55×10^{-01}	7.39×10^{-03}	1.00×10^{-02}	7.29×10^{-02}	2.45×10^{-01}
ISOPROPYLBENZENE	8.07×10^{-02}	3.84×10^{-03}	5.21×10^{-03}	3.79×10^{-02}	1.28×10^{-01}
LACTOL SPIRITS	7.65×10^{-02}	3.64×10^{-03}	4.93×10^{-03}	3.60×10^{-02}	1.21×10^{-01}
MALEIC ANHYDRIDE	1.49×10^{-02}	7.08×10^{-04}	9.59×10^{-04}	6.99×10^{-03}	2.35×10^{-02}
MANGANESE AND COMPOUNDS	5.64×10^{-03}	2.69×10^{-04}	3.64×10^{-04}	2.65×10^{-03}	8.93×10^{-03}
M-DIETHYLBENZENE	8.33×10^{-01}	3.97×10^{-02}	5.37×10^{-02}	3.91×10^{-01}	1.32
METHANE	$1.94 \times 10^{+01}$	9.22×10^{-01}	1.25	9.10	$3.06 \times 10^{+01}$
METHYL ACETATE	1.51×10^{-01}	7.18×10^{-03}	9.73×10^{-03}	7.09×10^{-02}	2.39×10^{-01}
METHYL ACRYLATE	8.07×10^{-02}	3.84×10^{-03}	5.21×10^{-03}	3.79×10^{-02}	1.28×10^{-01}
METHYL ALCOHOL	2.97×10^{-01}	1.42×10^{-02}	1.92×10^{-02}	1.40×10^{-01}	4.71×10^{-01}
METHYL AMYL KETONE	1.08×10^{-01}	5.16×10^{-03}	6.99×10^{-03}	5.09×10^{-02}	1.71×10^{-01}
METHYL CARBITOL	8.29×10^{-02}	3.95×10^{-03}	5.35×10^{-03}	3.89×10^{-02}	1.31×10^{-01}
METHYL CELLOSOLVE	8.29×10^{-02}	3.95×10^{-03}	5.35×10^{-03}	3.89×10^{-02}	1.31×10^{-01}
METHYL ETHYL KETONE	2.59×10^{-01}	1.23×10^{-02}	1.67×10^{-02}	1.22×10^{-01}	4.10×10^{-01}
METHYL FORMATE	4.46×10^{-02}	2.12×10^{-03}	2.88×10^{-03}	2.10×10^{-02}	7.06×10^{-02}
METHYL GLYOXAL	4.25×10^{-03}	2.02×10^{-04}	2.74×10^{-04}	2.00×10^{-03}	6.72×10^{-03}
METHYL ISOBUTYL KETONE	1.19×10^{-01}	5.67×10^{-03}	7.68×10^{-03}	5.59×10^{-02}	1.88×10^{-01}
METHYL METHACRYLATE	9.77×10^{-02}	4.65×10^{-03}	6.31×10^{-03}	4.59×10^{-02}	1.55×10^{-01}
METHYL MYRISTATE	6.37×10^{-03}	3.04×10^{-04}	4.11×10^{-04}	3.00×10^{-03}	1.01×10^{-02}
METHYL NAPHTHALENES	8.50×10^{-03}	4.05×10^{-04}	5.48×10^{-04}	3.99×10^{-03}	1.34×10^{-02}
METHYL PALMITATE	1.70×10^{-02}	8.09×10^{-04}	1.10×10^{-03}	7.99×10^{-03}	2.69×10^{-02}
METHYL STEARATE	2.34×10^{-02}	1.11×10^{-03}	1.51×10^{-03}	1.10×10^{-02}	3.70×10^{-02}
METHYL STYRENE	8.71×10^{-02}	4.15×10^{-03}	5.62×10^{-03}	4.09×10^{-02}	1.38×10^{-01}
METHYL TERT-BUTYL ETHER	$2.55 \times 10^{+01}$	1.22	1.65	$1.20 \times 10^{+01}$	$4.04 \times 10^{+01}$
METHYLACETYLENE	2.48×10^{-01}	1.18×10^{-02}	1.60×10^{-02}	1.17×10^{-01}	3.93×10^{-01}
METHYLAL	3.61×10^{-02}	1.72×10^{-03}	2.33×10^{-03}	1.70×10^{-02}	5.71×10^{-02}
METHYLALLENE	8.50×10^{-02}	4.05×10^{-03}	5.48×10^{-03}	3.99×10^{-02}	1.34×10^{-01}
METHYLCYCLOHEXANE	6.87×10^{-01}	3.27×10^{-02}	4.43×10^{-02}	3.23×10^{-01}	1.09
METHYLCYCLOPENTANE	8.91×10^{-01}	4.24×10^{-02}	5.75×10^{-02}	4.19×10^{-01}	1.41
METHYLCYCLOPENTENE	2.92×10^{-02}	1.39×10^{-03}	1.89×10^{-03}	1.37×10^{-02}	4.62×10^{-02}
METHYLDECANES	4.25×10^{-03}	2.02×10^{-04}	2.74×10^{-04}	2.00×10^{-03}	6.72×10^{-03}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
METHYLENE BROMIDE	6.37×10^{-03}	3.04×10^{-04}	4.11×10^{-04}	3.00×10^{-03}	1.01×10^{-02}
METHYLHEXANE	6.37×10^{-03}	3.04×10^{-04}	4.11×10^{-04}	3.00×10^{-03}	1.01×10^{-02}
METHYLNONANE	4.25×10^{-03}	2.02×10^{-04}	2.74×10^{-04}	2.00×10^{-03}	6.72×10^{-03}
METHYLOCTANES	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
METHYLPENTANE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
METHYLPROPYLCYCLOHEXANES	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
M-ETHYLTOLUENE	1.83	8.70×10^{-02}	1.18×10^{-01}	8.58×10^{-01}	2.89
METHYLUNDECANE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
MINERAL SPIRITS	1.36×10^{-01}	6.47×10^{-03}	8.77×10^{-03}	6.39×10^{-02}	2.15×10^{-01}
MYRCENE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
NAPHTHA	9.99×10^{-02}	4.75×10^{-03}	6.44×10^{-03}	4.69×10^{-02}	1.58×10^{-01}
NAPHTHALENE	1.29	6.13×10^{-02}	8.30×10^{-02}	6.05×10^{-01}	2.04
N-BUTANE	5.57	2.65×10^{-01}	3.59×10^{-01}	2.62	8.81
N-BUTYL ACETATE	1.23×10^{-01}	5.87×10^{-03}	7.95×10^{-03}	5.79×10^{-02}	1.95×10^{-01}
N-BUTYL ALCOHOL	1.47×10^{-01}	6.98×10^{-03}	9.46×10^{-03}	6.89×10^{-02}	2.32×10^{-01}
N-DECANE	2.92×10^{-01}	1.39×10^{-02}	1.89×10^{-02}	1.37×10^{-01}	4.62×10^{-01}
N-DODECANE	4.04×10^{-02}	1.92×10^{-03}	2.60×10^{-03}	1.90×10^{-02}	6.39×10^{-02}
N-HEPTANE	7.74×10^{-01}	3.69×10^{-02}	5.00×10^{-02}	3.64×10^{-01}	1.23
N-HEXANE	2.77	1.32×10^{-01}	1.79×10^{-01}	1.30	4.39
NICKEL AND COMPOUNDS	5.64×10^{-03}	2.69×10^{-04}	3.64×10^{-04}	2.65×10^{-03}	8.93×10^{-03}
NITRIC OXIDE	$1.29 \times 10^{+01}$	6.16×10^{-01}	8.35×10^{-01}	6.08	$2.05 \times 10^{+01}$
NITROBENZENE	7.01×10^{-02}	3.34×10^{-03}	4.52×10^{-03}	3.30×10^{-02}	1.11×10^{-01}
NITROGEN DIOXIDE	1.04	4.97×10^{-02}	6.74×10^{-02}	4.91×10^{-01}	1.65
N-NONANE	3.65×10^{-01}	1.74×10^{-02}	2.36×10^{-02}	1.72×10^{-01}	5.78×10^{-01}
N-OCTANE	4.38×10^{-01}	2.09×10^{-02}	2.83×10^{-02}	2.06×10^{-01}	6.94×10^{-01}
NONENONE	4.25×10^{-03}	2.02×10^{-04}	2.74×10^{-04}	2.00×10^{-03}	6.72×10^{-03}
N-PENTADECANE	3.61×10^{-02}	1.72×10^{-03}	2.33×10^{-03}	1.70×10^{-02}	5.71×10^{-02}
N-PENTANE	2.34	1.11×10^{-01}	1.51×10^{-01}	1.10	3.70
N-PENTYLCYCLOHEXANE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
N-PROPYL ACETATE	1.04×10^{-01}	4.96×10^{-03}	6.72×10^{-03}	4.89×10^{-02}	1.65×10^{-01}
N-PROPYL ALCOHOL	8.92×10^{-02}	4.25×10^{-03}	5.76×10^{-03}	4.19×10^{-02}	1.41×10^{-01}
N-PROPYLBENZENE	8.18×10^{-01}	3.90×10^{-02}	5.28×10^{-02}	3.85×10^{-01}	1.29
N-TETRADECANE	1.49×10^{-02}	7.08×10^{-04}	9.59×10^{-04}	6.99×10^{-03}	2.35×10^{-02}
N-TRIDECANE	2.12×10^{-02}	1.01×10^{-03}	1.37×10^{-03}	9.99×10^{-03}	3.36×10^{-02}
N-UNDECANE	8.77×10^{-01}	4.17×10^{-02}	5.66×10^{-02}	4.12×10^{-01}	1.39
OCTAMETHYLCYCLOTETRASILOXANE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
O-DICHLOROBENZENE	8.50×10^{-02}	4.05×10^{-03}	5.48×10^{-03}	3.99×10^{-02}	1.34×10^{-01}
O-ETHYLTOLUENE	3.80×10^{-01}	1.81×10^{-02}	2.45×10^{-02}	1.79×10^{-01}	6.01×10^{-01}
OXIDES OF NITROGEN	$2.09 \times 10^{+01}$	9.95×10^{-01}	1.35	9.82	$3.31 \times 10^{+01}$
PALMITIC ACID	4.25×10^{-02}	2.02×10^{-03}	2.74×10^{-03}	2.00×10^{-02}	6.72×10^{-02}
PARAFFINS (C16-C34)	4.25×10^{-03}	2.02×10^{-04}	2.74×10^{-04}	2.00×10^{-03}	6.72×10^{-03}
PARTICULATE MATTER < 10 μm	$1.13 \times 10^{+01}$	5.38×10^{-01}	7.28×10^{-01}	5.31	$1.79 \times 10^{+01}$
PARTICULATE MATTER < 2.5 μm	$1.04 \times 10^{+01}$	4.95×10^{-01}	6.70×10^{-01}	4.88	$1.64 \times 10^{+01}$
P-DICHLOROBENZENE	1.53×10^{-01}	7.28×10^{-03}	9.87×10^{-03}	7.19×10^{-02}	2.42×10^{-01}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
PHENANTHRENE	4.46×10^{-02}	2.12×10^{-03}	2.88×10^{-03}	2.10×10^{-02}	7.05×10^{-02}
PHENOL	9.35×10^{-02}	4.45×10^{-03}	6.03×10^{-03}	4.39×10^{-02}	1.48×10^{-01}
PHENYL ISOCYANATE	2.55×10^{-02}	1.21×10^{-03}	1.64×10^{-03}	1.20×10^{-02}	4.03×10^{-02}
PHTHALIC ANHYDRIDE	4.25×10^{-02}	2.02×10^{-03}	2.74×10^{-03}	2.00×10^{-02}	6.72×10^{-02}
PIPERYLENE	8.50×10^{-02}	4.05×10^{-03}	5.48×10^{-03}	3.99×10^{-02}	1.34×10^{-01}
POLYCHLORINATED DIOXINS AND FURANS	3.01×10^{-12}	1.43×10^{-13}	1.94×10^{-13}	1.41×10^{-12}	4.76×10^{-12}
POLYCYCLIC AROMATIC HYDROCARBONS	1.58	7.51×10^{-02}	1.02×10^{-01}	7.42×10^{-01}	2.50
PROPADIENE	1.90×10^{-01}	9.04×10^{-03}	1.23×10^{-02}	8.93×10^{-02}	3.01×10^{-01}
PROPANE	5.10×10^{-01}	2.43×10^{-02}	3.29×10^{-02}	2.40×10^{-01}	8.07×10^{-01}
PROPIONALDEHYDE	6.37×10^{-02}	3.04×10^{-03}	4.11×10^{-03}	3.00×10^{-02}	1.01×10^{-01}
PROPIONIC ACID	8.50×10^{-02}	4.05×10^{-03}	5.48×10^{-03}	3.99×10^{-02}	1.34×10^{-01}
PROPYLCYCLOHEXANE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
PROPYLENE	4.21	2.00×10^{-01}	2.71×10^{-01}	1.98	6.66
PROPYLENE DICHLORIDE	4.25×10^{-03}	2.02×10^{-04}	2.74×10^{-04}	2.00×10^{-03}	6.72×10^{-03}
PROPYLENE GLYCOL	8.07×10^{-02}	3.84×10^{-03}	5.21×10^{-03}	3.79×10^{-02}	1.28×10^{-01}
PROPYLENE OXIDE	1.06×10^{-01}	5.06×10^{-03}	6.85×10^{-03}	4.99×10^{-02}	1.68×10^{-01}
PYRENE	3.95×10^{-02}	1.88×10^{-03}	2.55×10^{-03}	1.86×10^{-02}	6.25×10^{-02}
RETENE	8.77×10^{-03}	4.18×10^{-04}	5.66×10^{-04}	4.12×10^{-03}	1.39×10^{-02}
S-BUTYL ALCOHOL	7.22×10^{-02}	3.44×10^{-03}	4.66×10^{-03}	3.40×10^{-02}	1.14×10^{-01}
S-BUTYLBENZENE	2.48×10^{-01}	1.18×10^{-02}	1.60×10^{-02}	1.17×10^{-01}	3.93×10^{-01}
STYRENE	7.12×10^{-01}	3.39×10^{-02}	4.59×10^{-02}	3.34×10^{-01}	1.13
SUBSTITUTED C9 ESTER (C12)	1.91×10^{-02}	9.11×10^{-04}	1.23×10^{-03}	8.99×10^{-03}	3.03×10^{-02}
SULFUR DIOXIDE	1.05	4.98×10^{-02}	6.75×10^{-02}	4.92×10^{-01}	1.66
T-3-HEXENE	2.92×10^{-01}	1.39×10^{-02}	1.89×10^{-02}	1.37×10^{-01}	4.62×10^{-01}
TERT-BUTYL ALCOHOL	8.92×10^{-02}	4.25×10^{-03}	5.76×10^{-03}	4.19×10^{-02}	1.41×10^{-01}
TETRACHLOROETHYLENE	1.49×10^{-01}	7.08×10^{-03}	9.59×10^{-03}	6.99×10^{-02}	2.35×10^{-01}
TETRAFLUOROMETHANE	6.37×10^{-03}	3.04×10^{-04}	4.11×10^{-04}	3.00×10^{-03}	1.01×10^{-02}
TOLUENE	$1.95 \times 10^{+01}$	9.30×10^{-01}	1.26	9.18	$3.09 \times 10^{+01}$
TOLUENE DIISOCYANATE	1.40×10^{-01}	6.68×10^{-03}	9.05×10^{-03}	6.59×10^{-02}	2.22×10^{-01}
TOTAL AROMATIC AMINES	8.50×10^{-03}	4.05×10^{-04}	5.48×10^{-04}	3.99×10^{-03}	1.34×10^{-02}
TOTAL C2-C5 ALDEHYDES	2.55×10^{-02}	1.21×10^{-03}	1.64×10^{-03}	1.20×10^{-02}	4.03×10^{-02}
TOTAL SUSPENDED PARTICULATES	$1.19 \times 10^{+01}$	5.66×10^{-01}	7.67×10^{-01}	5.59	$1.88 \times 10^{+01}$
TOTAL VOCS	$1.89 \times 10^{+02}$	8.98	$1.22 \times 10^{+01}$	$8.87 \times 10^{+01}$	$2.99 \times 10^{+02}$
TRANS-2-BUTENE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
TRANS-2-PENTENE	4.97×10^{-01}	2.37×10^{-02}	3.20×10^{-02}	2.34×10^{-01}	7.86×10^{-01}
TRICHLOROBENZENES	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
TRICHLOROETHYLENE	9.14×10^{-02}	4.35×10^{-03}	5.89×10^{-03}	4.29×10^{-02}	1.45×10^{-01}
TRICHLOROFLUOROMETHANE	1.30×10^{-01}	6.17×10^{-03}	8.36×10^{-03}	6.09×10^{-02}	2.05×10^{-01}
TRICHLOROTRIFLUOROETHANE	8.50×10^{-02}	4.05×10^{-03}	5.48×10^{-03}	3.99×10^{-02}	1.34×10^{-01}
TRIFLUOROMETHANE	6.37×10^{-02}	3.04×10^{-03}	4.11×10^{-03}	3.00×10^{-02}	1.01×10^{-01}
TRIMETHYLBENZENE	2.34×10^{-02}	1.11×10^{-03}	1.51×10^{-03}	1.10×10^{-02}	3.70×10^{-02}
TRIMETHYLCYCLOHEXANES	4.25×10^{-03}	2.02×10^{-04}	2.74×10^{-04}	2.00×10^{-03}	6.72×10^{-03}
TRIMETHYLCYCLOPENTANE	2.12×10^{-03}	1.01×10^{-04}	1.37×10^{-04}	9.99×10^{-04}	3.36×10^{-03}
TRIMETHYLDECENE	4.25×10^{-03}	2.02×10^{-04}	2.74×10^{-04}	2.00×10^{-03}	6.72×10^{-03}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
TRIMETHYLFLUOROSILANE	1.47×10^{-01}	6.98×10^{-03}	9.46×10^{-03}	6.89×10^{-02}	2.32×10^{-01}
TRIMETHYLHEPTANES	4.25×10^{-03}	2.02×10^{-04}	2.74×10^{-04}	2.00×10^{-03}	6.72×10^{-03}
VINYL ACETATE	1.17×10^{-01}	5.56×10^{-03}	7.54×10^{-03}	5.49×10^{-02}	1.85×10^{-01}
VINYL CHLORIDE	8.92×10^{-02}	4.25×10^{-03}	5.76×10^{-03}	4.19×10^{-02}	1.41×10^{-01}
ZINC AND COMPOUNDS	5.64×10^{-03}	2.69×10^{-04}	3.64×10^{-04}	2.65×10^{-03}	8.93×10^{-03}

Table C1.25: Annual Emissions from Recreational Boats – Diesel

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
1,2,4-TRIMETHYLBENZENE	1.26×10^{-02}	5.99×10^{-04}	8.11×10^{-04}	5.91×10^{-03}	1.99×10^{-02}
1,3,5-TRIMETHYLBENZENE	3.72×10^{-03}	1.77×10^{-04}	2.40×10^{-04}	1.75×10^{-03}	5.88×10^{-03}
1,3-BUTADIENE	4.43×10^{-03}	2.11×10^{-04}	2.86×10^{-04}	2.08×10^{-03}	7.01×10^{-03}
1-METHYL-3-ETHYLBENZENE	3.00×10^{-03}	1.43×10^{-04}	1.94×10^{-04}	1.41×10^{-03}	4.75×10^{-03}
1-METHYL-4-ETHYLBENZENE	7.43×10^{-03}	3.54×10^{-04}	4.79×10^{-04}	3.49×10^{-03}	1.18×10^{-02}
1-METHYLNAPHTHALENE	5.40×10^{-03}	2.57×10^{-04}	3.48×10^{-04}	2.54×10^{-03}	8.54×10^{-03}
1-METHYLPHENANTHRENE	2.43×10^{-04}	1.16×10^{-05}	1.57×10^{-05}	1.14×10^{-04}	3.84×10^{-04}
2,2,4-TRIMETHYLPENTANE	1.77×10^{-02}	8.44×10^{-04}	1.14×10^{-03}	8.33×10^{-03}	2.80×10^{-02}
2,2-DIMETHYLBUTANE	4.43×10^{-03}	2.11×10^{-04}	2.86×10^{-04}	2.08×10^{-03}	7.01×10^{-03}
2,3,4-TRIMETHYLPENTANE	4.43×10^{-03}	2.11×10^{-04}	2.86×10^{-04}	2.08×10^{-03}	7.01×10^{-03}
2,3-DIMETHYLBUTANE	8.14×10^{-03}	3.88×10^{-04}	5.25×10^{-04}	3.83×10^{-03}	1.29×10^{-02}
2,3-DIMETHYLHEXANE	2.29×10^{-03}	1.09×10^{-04}	1.48×10^{-04}	1.07×10^{-03}	3.62×10^{-03}
2,3-DIMETHYLPENTANE	1.03×10^{-02}	4.90×10^{-04}	6.64×10^{-04}	4.84×10^{-03}	1.63×10^{-02}
2,4-DIMETHYLHEXANE	7.16×10^{-04}	3.41×10^{-05}	4.62×10^{-05}	3.36×10^{-04}	1.13×10^{-03}
2,4-DIMETHYLPENTANE	5.86×10^{-03}	2.79×10^{-04}	3.78×10^{-04}	2.75×10^{-03}	9.27×10^{-03}
2,5-DIMETHYLHEXANE	7.16×10^{-04}	3.41×10^{-05}	4.62×10^{-05}	3.36×10^{-04}	1.13×10^{-03}
2-METHYL-1-BUTENE	3.72×10^{-03}	1.77×10^{-04}	2.40×10^{-04}	1.75×10^{-03}	5.88×10^{-03}
2-METHYL-2-PENTENE	3.00×10^{-03}	1.43×10^{-04}	1.94×10^{-04}	1.41×10^{-03}	4.75×10^{-03}
2-METHYL-2-PROPENAL	5.71×10^{-02}	2.72×10^{-03}	3.69×10^{-03}	2.69×10^{-02}	9.04×10^{-02}
2-METHYLANTHRACENE	1.48×10^{-04}	7.04×10^{-06}	9.54×10^{-06}	6.95×10^{-05}	2.34×10^{-04}
2-METHYLCHOLANTHRENE	1.03×10^{-03}	4.89×10^{-05}	6.63×10^{-05}	4.83×10^{-04}	1.63×10^{-03}
2-METHYLHEPTANE	1.43×10^{-03}	6.80×10^{-05}	9.22×10^{-05}	6.71×10^{-04}	2.26×10^{-03}
2-METHYLHEXANE	8.14×10^{-03}	3.88×10^{-04}	5.25×10^{-04}	3.83×10^{-03}	1.29×10^{-02}
2-METHYLNAPHTHALENE	8.73×10^{-03}	4.16×10^{-04}	5.63×10^{-04}	4.10×10^{-03}	1.38×10^{-02}
2-METHYLPENTANE	1.33×10^{-02}	6.33×10^{-04}	8.57×10^{-04}	6.25×10^{-03}	2.10×10^{-02}
3-ETHYLHEXANE	3.00×10^{-03}	1.43×10^{-04}	1.94×10^{-04}	1.41×10^{-03}	4.75×10^{-03}
3-METHYL-1-BUTENE	2.29×10^{-03}	1.09×10^{-04}	1.48×10^{-04}	1.07×10^{-03}	3.62×10^{-03}
3-METHYLHEXANE	4.43×10^{-03}	2.11×10^{-04}	2.86×10^{-04}	2.08×10^{-03}	7.01×10^{-03}
3-METHYLPENTANE	9.57×10^{-03}	4.56×10^{-04}	6.18×10^{-04}	4.50×10^{-03}	1.51×10^{-02}
3-METHYLPHENANTHRENE	4.33×10^{-04}	2.06×10^{-05}	2.79×10^{-05}	2.04×10^{-04}	6.85×10^{-04}
9-METHYLPHENANTHRENE	3.27×10^{-04}	1.56×10^{-05}	2.11×10^{-05}	1.54×10^{-04}	5.18×10^{-04}
ACENAPHTHENE	2.33×10^{-03}	1.11×10^{-04}	1.51×10^{-04}	1.10×10^{-03}	3.69×10^{-03}
ACENAPHTHYLENE	1.96×10^{-03}	9.32×10^{-05}	1.26×10^{-04}	9.20×10^{-04}	3.10×10^{-03}
ACETALDEHYDE	5.97×10^{-01}	2.84×10^{-02}	3.85×10^{-02}	2.81×10^{-01}	9.45×10^{-01}
ACETOPHENONE	7.29×10^{-02}	3.47×10^{-03}	4.70×10^{-03}	3.42×10^{-02}	1.15×10^{-01}
ACETYLENE	6.57×10^{-02}	3.13×10^{-03}	4.24×10^{-03}	3.09×10^{-02}	1.04×10^{-01}
ACROLEIN	4.86×10^{-02}	2.31×10^{-03}	3.13×10^{-03}	2.28×10^{-02}	7.69×10^{-02}
ANTHRACENE	3.79×10^{-04}	1.80×10^{-05}	2.44×10^{-05}	1.78×10^{-04}	5.99×10^{-04}
ANTIMONY AND COMPOUNDS	1.05×10^{-04}	5.01×10^{-06}	6.79×10^{-06}	4.94×10^{-05}	1.66×10^{-04}
ARSENIC AND COMPOUNDS	1.10×10^{-04}	5.23×10^{-06}	7.08×10^{-06}	5.16×10^{-05}	1.74×10^{-04}
BENZALDEHYDE	5.43×10^{-02}	2.59×10^{-03}	3.50×10^{-03}	2.55×10^{-02}	8.59×10^{-02}
BENZENE	3.91×10^{-02}	1.86×10^{-03}	2.53×10^{-03}	1.84×10^{-02}	6.19×10^{-02}
BENZO(A)ANTHRACENE	4.64×10^{-04}	2.21×10^{-05}	2.99×10^{-05}	2.18×10^{-04}	7.34×10^{-04}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
BENZO(A)PYRENE	3.81×10^{-04}	1.82×10^{-05}	2.46×10^{-05}	1.79×10^{-04}	6.03×10^{-04}
BENZO(B)FLUORANTHENE	2.12×10^{-04}	1.01×10^{-05}	1.36×10^{-05}	9.94×10^{-05}	3.35×10^{-04}
BENZO(E)PYRENE	2.25×10^{-04}	1.07×10^{-05}	1.45×10^{-05}	1.06×10^{-04}	3.56×10^{-04}
BENZO(G,H,I)FLUORANTHENE	8.19×10^{-05}	3.90×10^{-06}	5.28×10^{-06}	3.85×10^{-05}	1.30×10^{-04}
BENZO(G,H,I,)PERYLENE	1.58×10^{-04}	7.55×10^{-06}	1.02×10^{-05}	7.45×10^{-05}	2.51×10^{-04}
BENZO(K)FLUORANTHENE	2.04×10^{-04}	9.71×10^{-06}	1.32×10^{-05}	9.59×10^{-05}	3.23×10^{-04}
BERYLLIUM AND COMPOUNDS	4.02×10^{-04}	1.91×10^{-05}	2.59×10^{-05}	1.89×10^{-04}	6.35×10^{-04}
BUTYRALDEHYDE	1.86×10^{-02}	8.84×10^{-04}	1.20×10^{-03}	8.73×10^{-03}	2.94×10^{-02}
CADMIUM AND COMPOUNDS	1.14×10^{-05}	5.44×10^{-07}	7.37×10^{-07}	5.37×10^{-06}	1.81×10^{-05}
CARBON MONOXIDE	8.33	3.96×10^{-01}	5.37×10^{-01}	3.91	$1.32 \times 10^{+01}$
CHROMIUM (III) COMPOUNDS	3.06×10^{-05}	1.46×10^{-06}	1.98×10^{-06}	1.44×10^{-05}	4.84×10^{-05}
CHROMIUM (VI) COMPOUNDS	1.27×10^{-05}	6.07×10^{-07}	8.22×10^{-07}	5.99×10^{-06}	2.02×10^{-05}
CHRYSENE	2.54×10^{-04}	1.21×10^{-05}	1.64×10^{-05}	1.19×10^{-04}	4.02×10^{-04}
CIS-2-BUTENE	3.72×10^{-03}	1.77×10^{-04}	2.40×10^{-04}	1.75×10^{-03}	5.88×10^{-03}
CIS-2-HEXENE	1.43×10^{-03}	6.80×10^{-05}	9.22×10^{-05}	6.71×10^{-04}	2.26×10^{-03}
COBALT AND COMPOUNDS	7.77×10^{-05}	3.70×10^{-06}	5.01×10^{-06}	3.65×10^{-05}	1.23×10^{-04}
COPPER AND COMPOUNDS	1.14×10^{-03}	5.42×10^{-05}	7.35×10^{-05}	5.35×10^{-04}	1.80×10^{-03}
CORONENE	1.06×10^{-05}	5.04×10^{-07}	6.82×10^{-07}	4.97×10^{-06}	1.67×10^{-05}
CROTONALDEHYDE	1.91×10^{-01}	9.12×10^{-03}	1.24×10^{-02}	9.00×10^{-02}	3.03×10^{-01}
CYCLOHEXANE	3.00×10^{-03}	1.43×10^{-04}	1.94×10^{-04}	1.41×10^{-03}	4.75×10^{-03}
CYCLOPENTA(C,D)PYRENE	3.49×10^{-04}	1.66×10^{-05}	2.25×10^{-05}	1.64×10^{-04}	5.52×10^{-04}
CYCLOPENTANE	5.86×10^{-03}	2.79×10^{-04}	3.78×10^{-04}	2.75×10^{-03}	9.27×10^{-03}
CYCLOPENTENE	3.00×10^{-03}	1.43×10^{-04}	1.94×10^{-04}	1.41×10^{-03}	4.75×10^{-03}
DECANOIC ACID	1.04×10^{-03}	4.95×10^{-05}	6.71×10^{-05}	4.89×10^{-04}	1.65×10^{-03}
DECYLCYCLOHEXANE	5.47×10^{-04}	2.60×10^{-05}	3.53×10^{-05}	2.57×10^{-04}	8.65×10^{-04}
DIACETYL	1.29×10^{-02}	6.12×10^{-04}	8.30×10^{-04}	6.04×10^{-03}	2.03×10^{-02}
DIBENZO(A,H)ANTHRACENE	2.05×10^{-04}	9.78×10^{-06}	1.33×10^{-05}	9.66×10^{-05}	3.25×10^{-04}
DIBENZOFURAN	4.09×10^{-04}	1.95×10^{-05}	2.64×10^{-05}	1.92×10^{-04}	6.48×10^{-04}
EICOSANE	2.94×10^{-03}	1.40×10^{-04}	1.90×10^{-04}	1.38×10^{-03}	4.66×10^{-03}
ETHYLBENZENE	6.72×10^{-03}	3.20×10^{-04}	4.33×10^{-04}	3.16×10^{-03}	1.06×10^{-02}
ETHYLENE	1.22×10^{-01}	5.82×10^{-03}	7.89×10^{-03}	5.75×10^{-02}	1.93×10^{-01}
FLUORANTHENE	1.69×10^{-04}	8.04×10^{-06}	1.09×10^{-05}	7.94×10^{-05}	2.67×10^{-04}
FLUORENE	1.44×10^{-03}	6.88×10^{-05}	9.32×10^{-05}	6.79×10^{-04}	2.29×10^{-03}
FORMALDEHYDE	3.19×10^{-01}	1.52×10^{-02}	2.06×10^{-02}	1.50×10^{-01}	5.04×10^{-01}
GLYOXAL	3.00×10^{-02}	1.43×10^{-03}	1.94×10^{-03}	1.41×10^{-02}	4.75×10^{-02}
HEPTADECANE	8.77×10^{-03}	4.18×10^{-04}	5.66×10^{-04}	4.12×10^{-03}	1.39×10^{-02}
HEPTANAL	4.57×10^{-02}	2.18×10^{-03}	2.95×10^{-03}	2.15×10^{-02}	7.23×10^{-02}
HEPTYLCYCLOHEXANE	2.85×10^{-04}	1.36×10^{-05}	1.84×10^{-05}	1.34×10^{-04}	4.51×10^{-04}
HEXADECANE	1.02×10^{-02}	4.84×10^{-04}	6.55×10^{-04}	4.77×10^{-03}	1.61×10^{-02}
HEXALDEHYDE	3.14×10^{-02}	1.50×10^{-03}	2.03×10^{-03}	1.48×10^{-02}	4.97×10^{-02}
HEXYLCYCLOHEXANE	2.14×10^{-04}	1.02×10^{-05}	1.38×10^{-05}	1.01×10^{-04}	3.38×10^{-04}
INDENO(1,2,3-C,D)PYRENE	2.96×10^{-04}	1.41×10^{-05}	1.91×10^{-05}	1.39×10^{-04}	4.69×10^{-04}
ISOBUTYLENE	1.63×10^{-02}	7.76×10^{-04}	1.05×10^{-03}	7.66×10^{-03}	2.58×10^{-02}
ISOMERS OF XYLENE	4.51×10^{-02}	2.15×10^{-03}	2.91×10^{-03}	2.12×10^{-02}	7.14×10^{-02}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
ISOPENTANE	3.91×10^{-02}	1.86×10^{-03}	2.53×10^{-03}	1.84×10^{-02}	6.19×10^{-02}
LAURIC ACID	8.37×10^{-04}	3.99×10^{-05}	5.40×10^{-05}	3.93×10^{-04}	1.32×10^{-03}
LEAD AND COMPOUNDS	1.07×10^{-04}	5.12×10^{-06}	6.94×10^{-06}	5.05×10^{-05}	1.70×10^{-04}
MERCURY AND COMPOUNDS	2.75×10^{-05}	1.31×10^{-06}	1.77×10^{-06}	1.29×10^{-05}	4.35×10^{-05}
METHYL ETHYL KETONE	1.07×10^{-01}	5.10×10^{-03}	6.91×10^{-03}	5.04×10^{-02}	1.70×10^{-01}
METHYLCYCLOHEXANE	7.43×10^{-03}	3.54×10^{-04}	4.79×10^{-04}	3.49×10^{-03}	1.18×10^{-02}
METHYLCYCLOPENTANE	8.86×10^{-03}	4.22×10^{-04}	5.72×10^{-04}	4.16×10^{-03}	1.40×10^{-02}
METHYLGLYOXAL	2.43×10^{-02}	1.16×10^{-03}	1.57×10^{-03}	1.14×10^{-02}	3.84×10^{-02}
MYRISTIC ACID	7.66×10^{-05}	3.65×10^{-06}	4.94×10^{-06}	3.60×10^{-05}	1.21×10^{-04}
NAPHTHALENE	1.10×10^{-02}	5.22×10^{-04}	7.07×10^{-04}	5.15×10^{-03}	1.73×10^{-02}
N-BUTANE	5.47×10^{-02}	2.61×10^{-03}	3.53×10^{-03}	2.57×10^{-02}	8.66×10^{-02}
N-DODECANE	7.19×10^{-03}	3.42×10^{-04}	4.64×10^{-04}	3.38×10^{-03}	1.14×10^{-02}
N-HENEICOSANE	9.40×10^{-04}	4.48×10^{-05}	6.06×10^{-05}	4.42×10^{-04}	1.49×10^{-03}
N-HEPTANE	6.72×10^{-03}	3.20×10^{-04}	4.33×10^{-04}	3.16×10^{-03}	1.06×10^{-02}
NICKEL AND COMPOUNDS	9.04×10^{-03}	4.30×10^{-04}	5.83×10^{-04}	4.25×10^{-03}	1.43×10^{-02}
NITRIC OXIDE	$1.67 \times 10^{+01}$	7.95×10^{-01}	1.08	7.85	$2.64 \times 10^{+01}$
NITROGEN DIOXIDE	1.35	6.42×10^{-02}	8.70×10^{-02}	6.34×10^{-01}	2.13
N-NONANE	2.29×10^{-03}	1.09×10^{-04}	1.48×10^{-04}	1.07×10^{-03}	3.62×10^{-03}
N-NONYLCYCLOHEXANE	3.54×10^{-04}	1.68×10^{-05}	2.28×10^{-05}	1.66×10^{-04}	5.60×10^{-04}
N-OCTANE	3.72×10^{-03}	1.77×10^{-04}	2.40×10^{-04}	1.75×10^{-03}	5.88×10^{-03}
NONADECANE	5.87×10^{-03}	2.80×10^{-04}	3.79×10^{-04}	2.76×10^{-03}	9.29×10^{-03}
NONANOIC ACID	3.43×10^{-03}	1.63×10^{-04}	2.21×10^{-04}	1.61×10^{-03}	5.43×10^{-03}
N-PENTANE	2.66×10^{-02}	1.27×10^{-03}	1.71×10^{-03}	1.25×10^{-02}	4.20×10^{-02}
N-PROPYLBENZENE	1.43×10^{-03}	6.80×10^{-05}	9.22×10^{-05}	6.71×10^{-04}	2.26×10^{-03}
N-TRIDECANE	6.82×10^{-03}	3.25×10^{-04}	4.40×10^{-04}	3.20×10^{-03}	1.08×10^{-02}
OCTADECANE	8.59×10^{-03}	4.09×10^{-04}	5.54×10^{-04}	4.04×10^{-03}	1.36×10^{-02}
OCTANAL	4.43×10^{-02}	2.11×10^{-03}	2.86×10^{-03}	2.08×10^{-02}	7.01×10^{-02}
OCTANOIC ACID	1.79×10^{-03}	8.50×10^{-05}	1.15×10^{-04}	8.39×10^{-04}	2.82×10^{-03}
OCTYLCYCLOHEXANE	3.75×10^{-04}	1.79×10^{-05}	2.42×10^{-05}	1.76×10^{-04}	5.93×10^{-04}
OXIDES OF NITROGEN	$2.70 \times 10^{+01}$	1.28	1.74	$1.27 \times 10^{+01}$	$4.26 \times 10^{+01}$
PARTICULATE MATTER < 10 µm	1.65	7.84×10^{-02}	1.06×10^{-01}	7.74×10^{-01}	2.60
PARTICULATE MATTER < 2.5 µm	1.60	7.60×10^{-02}	1.03×10^{-01}	7.51×10^{-01}	2.53
PENTADECANE	5.69×10^{-03}	2.71×10^{-04}	3.67×10^{-04}	2.67×10^{-03}	9.00×10^{-03}
PENTYLCYCLOHEXANE	1.20×10^{-03}	5.71×10^{-05}	7.73×10^{-05}	5.64×10^{-04}	1.90×10^{-03}
PHENANTHRENE	1.10×10^{-03}	5.25×10^{-05}	7.11×10^{-05}	5.18×10^{-04}	1.74×10^{-03}
POLYCHLORINATED DIOXINS AND FURANS	3.69×10^{-09}	1.76×10^{-10}	2.38×10^{-10}	1.73×10^{-09}	5.83×10^{-09}
POLYCYCLIC AROMATIC HYDROCARBONS	2.13×10^{-02}	1.02×10^{-03}	1.38×10^{-03}	1.00×10^{-02}	3.37×10^{-02}
PROPIONALDEHYDE	2.00×10^{-01}	9.52×10^{-03}	1.29×10^{-02}	9.40×10^{-02}	3.16×10^{-01}
PROPYLENE	1.11×10^{-02}	5.31×10^{-04}	7.19×10^{-04}	5.24×10^{-03}	1.76×10^{-02}
PYRENE	9.73×10^{-05}	4.63×10^{-06}	6.28×10^{-06}	4.57×10^{-05}	1.54×10^{-04}
RETENE	1.10×10^{-04}	5.25×10^{-06}	7.11×10^{-06}	5.18×10^{-05}	1.74×10^{-04}
SELENIUM AND COMPOUNDS	2.39×10^{-04}	1.14×10^{-05}	1.54×10^{-05}	1.12×10^{-04}	3.78×10^{-04}
SULFUR DIOXIDE	6.68	3.18×10^{-01}	4.31×10^{-01}	3.14	$1.06 \times 10^{+01}$
TETRADECANE	8.99×10^{-03}	4.28×10^{-04}	5.80×10^{-04}	4.22×10^{-03}	1.42×10^{-02}

SUBSTANCE	EMISSIONS (TONNES/YEAR)				
	SYDNEY	NEWCASTLE	WOLLONGONG	NON-URBAN	GMR
TOLUENE	5.69×10^{-02}	2.71×10^{-03}	3.67×10^{-03}	2.67×10^{-02}	9.00×10^{-02}
TOTAL SUSPENDED PARTICULATES	1.73	8.25×10^{-02}	1.12×10^{-01}	8.14×10^{-01}	2.74
TOTAL VOCS	2.64	1.26×10^{-01}	1.71×10^{-01}	1.24	4.18
TRANS-2-BUTENE	7.43×10^{-03}	3.54×10^{-04}	4.79×10^{-04}	3.49×10^{-03}	1.18×10^{-02}
TRANS-2-HEXENE	2.29×10^{-03}	1.09×10^{-04}	1.48×10^{-04}	1.07×10^{-03}	3.62×10^{-03}
TRANS-2-PENTENE	7.16×10^{-04}	3.41×10^{-05}	4.62×10^{-05}	3.36×10^{-04}	1.13×10^{-03}
TRIDECANOIC ACID	1.87×10^{-04}	8.93×10^{-06}	1.21×10^{-05}	8.81×10^{-05}	2.97×10^{-04}
UNDECANOIC ACID	2.94×10^{-03}	1.40×10^{-04}	1.90×10^{-04}	1.38×10^{-03}	4.66×10^{-03}
ZINC AND COMPOUNDS	1.07×10^{-03}	5.10×10^{-05}	6.90×10^{-05}	5.03×10^{-04}	1.69×10^{-03}