16. Appendices

16.1 Appendix A – dioxin profiles

Table A.1 – Congener profiles

(2,3,7,8) Congener Profiles *Petrol Light-Duty Vehicles [%]*		Leaded Non-Catalyst				Unleaded Non-Catalyst			Unleaded Catalyst		
		Marklund et al. 1990	Hagenmaier et al 1990	Schwind et al. 1991	Briz et al. 2000	Marklund et al. 1990	Hagenmaier et al 1990	Schwind et al. 1991	Marklund et al. 1990	Hagenmaier et al 1990	Schwind et al. 1991
PCDD CONGENER	2,3,7,8-TCDD	1%	1%	0%	1%	1%	0%	1%	1%	1%	1%
	1,2,3,7,8-PeCDD	4%	4%	1%	3%	1%	3%	1%	1%	1%	1%
	1,2,3,4,7,8-HxCDD	2%	2%	0%	2%	3%	2%	1%	3%	1%	1%
	1,2,3,6,7,8-HxCDD	2%	2%	1%	4%	3%	2%	4%	3%	1%	1%
	1,2,3,7,8,9-HxCDD	2%	2%	0%	3%	3%	2%	1%	3%	1%	1%
	1,2,3,4,6,7,8-HpCDD	5%	4%	6%	6%	10%	6%	9%	10%	6%	6%
	OCDD	9%	4%	19%	16%	12%	25%	39%	12%	63%	36%
PCDF CONGENER	2,3,7,8-TCDF	43%	13%	3%	2%	16%	6%	3%	16%	2%	2%
	1,2,3,7,8-PeCDF	2%	9%	3%	4%	2%	6%	2%	2%	1%	2%
	2,3,4,7,8-PeCDF	4%	4%	3%	4%	2%	3%	1%	2%	1%	1%
	1,2,3,4,7,8-HxCDF	1%	7%	5%	5%	2%	6%	3%	2%	2%	2%
	1,2,3,6,7,8-HxCDF	1%	7%	4%	3%	2%	3%	3%	2%	2%	2%
	1,2,3,7,8,9-HxCDF	1%	1%	1%	2%	2%	5%	2%	2%	0%	1%
	2,3,4,6,7,8-HxCDF	1%	2%	12%	5%	2%	8%	2%	2%	2%	4%
	1,2,3,4,6,7,8-HpCDF	5%	35%	27%	12%	10%	4%	12%	10%	6%	11%
	1,2,3,4,7,8,9-HpCDF	5%	1%	1%	4%	10%	2%	0%	10%	0%	1%
	OCDF	9%	2%	13%	22%	17%	17%	17%	17%	10%	8%
TOTAL		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

(2,3,7,8) Congener Profiles *Diesel Vehicles [%]*		LDV		HDV					
		Hagenmaier et al 1990	Schwind et al. 1991	Schwind et al. 1991	Lew 1993 & 1996	Gullett & Ryan 1997 [HWAY]	Gullett & Ryan 1997 [CITY]	Geueke et al. 1999	Gertler et al 1998
PCDD CONGENER	2,3,7,8-TCDD	1%	1%	1%	0%	6%	12%	0%	1%
	1,2,3,7,8-PeCDD	1%	1%	0%	0%	5%	12%	2%	0%
	1,2,3,4,7,8-HxCDD	1%	0%	1%	0%	3%	4%	1%	1%
	1,2,3,6,7,8-HxCDD	1%	1%	1%	0%	4%	5%	2%	1%
	1,2,3,7,8,9-HxCDD	1%	1%	1%	0%	4%	5%	2%	2%
	1,2,3,4,6,7,8-HpCDD	6%	9%	4%	16%	3%	2%	20%	14%
	OCDD	61%	29%	50%	46%	1%	1%	50%	65%
PCDF CONGENER	2,3,7,8-TCDF	3%	12%	3%	0%	10%	5%	4%	1%
	1,2,3,7,8-PeCDF	1%	6%	2%	1%	3%	1%	1%	1%
	2,3,4,7,8-PeCDF	1%	4%	1%	1%	19%	18%	2%	1%
	1,2,3,4,7,8-HxCDF	1%	4%	2%	1%	16%	12%	2%	2%
	1,2,3,6,7,8-HxCDF	1%	3%	3%	1%	10%	7%	2%	1%
	1,2,3,7,8,9-HxCDF	1%	0%	0%	2%	2%	3%	0%	1%
	2,3,4,6,7,8-HxCDF	1%	2%	2%	1%	10%	7%	2%	1%
	1,2,3,4,6,7,8-HpCDF	6%	11%	14%	10%	3%	2%	7%	4%
	1,2,3,4,7,8,9-HpCDF	1%	0%	1%	2%	2%	1%	1%	0%
	OCDF	12%	16%	15%	19%	1%	1%	1%	4%
TOTAL		100%	100%	100%	100%	100%	100%	100%	100%

(2,3,7,8) Congener Profiles *Fleet [%]*		Tunnel Studies	
		Odilnie et al. 1991	Wevers et al. 1992
PCDD CONGENER	2,3,7,8-TCDD	0%	0%
	1,2,3,7,8-PeCDD	2%	1%
	1,2,3,4,7,8-HxCDD	1%	1%
	1,2,3,6,7,8-HxCDD	3%	1%
	1,2,3,7,8,9-HxCDD	2%	1%
	1,2,3,4,6,7,8-HpCDD	14%	11%
	OCDD	1%	53%
PCDF CONGENER	2,3,7,8-TCDF	4%	0%
	1,2,3,7,8-PeCDF	8%	3%
	2,3,4,7,8-PeCDF	6%	1%
	1,2,3,4,7,8-HxCDF	8%	2%
	1,2,3,6,7,8-HxCDF	6%	2%
	1,2,3,7,8,9-HxCDF	0%	3%
	2,3,4,6,7,8-HxCDF	7%	0%
	1,2,3,4,6,7,8-HpCDF	17%	12%
	1,2,3,4,7,8,9-HpCDF	2%	2%
	OCDF	16%	6%
TOTAL		100%	100%

Table A.2 – Homologue profiles

Homologue Profiles *Petrol Light-Duty Vehicles [%]*		Leaded Non-Catalyst			Unleaded Non-Catalyst			Unleaded Catalyst		
		Marklund et al. 1990	Hagenmaier et al 1990	Schwind et al. 1991	Marklund et al. 1990	Hagenmaier et al 1990	Schwind et al. 1991	Marklund et al. 1990	Hagenmaier et al 1990	Schwind et al. 1991
HOMOLOGUE TOTAL	TCDD	21%	5%	5%	4%	11%	8%	4%	6%	5%
	PeCDD	1%	4%	2%	1%	12%	16%	1%	5%	5%
	HxCDD	2%	2%	5%	13%	8%	10%	13%	5%	6%
	HpCDD	0%	1%	5%	3%	2%	8%	3%	8%	5%
	OCDD	0%	1%	8%	2%	4%	17%	2%	35%	30%
	TCDF	61%	59%	22%	54%	14%	14%	54%	11%	16%
	PeCDF	10%	13%	16%	2%	23%	10%	2%	11%	13%
	HxCDF	2%	7%	16%	13%	10%	3%	13%	7%	8%
	HpCDF	1%	7%	15%	6%	12%	5%	6%	6%	7%
	OCDF	0%	0%	6%	2%	3%	7%	2%	6%	4%
TOTAL		100%	100%	100%	100%	100%	100%	100%	100%	100%

Homologue Profiles *Diesel Vehicles [%]*		LDV		HDV			
		Hagenmaier et al 1990	Schwind et al. 1991	Schwind et al. 1991	Lew 1993 & 1996	Geueke et al. 1999	Gertler et al. 1998
HOMOLOGUE TOTAL	TCDD	4%	6%	5%	0%	6%	1%
	PeCDD	2%	3%	1%	0%	11%	1%
	HxCDD	3%	2%	3%	4%	15%	11%
	HpCDD	10%	5%	5%	18%	15%	20%
	OCDD	48%	8%	31%	30%	19%	42%
	TCDF	8%	44%	18%	2%	12%	9%
	PeCDF	4%	17%	5%	4%	12%	5%
	HxCDF	3%	7%	12%	15%	6%	4%
	HpCDF	9%	3%	12%	13%	4%	4%
	OCDF	10%	4%	9%	12%	0%	3%
TOTAL		100%	100%	100%	100%	100%	100%

(2,3,7,8) Congener Profiles *Fleet [%]*		Tunnel Studies
		Oehme et al. 1991
HOMOLOGUE TOTAL	TCDD	1%
	PeCDD	5%
	HxCDD	3%
	HpCDD	3%
	OCDD	0%
	TCDF	34%
	PeCDF	26%
	HxCDF	17%
	HpCDF	7%
	OCDF	4%
TOTAL		100%

16.2 Appendix B – total dioxins emissions

Table B.1 – Minimum total dioxins emissions based on ABS Fuel Consumption Data [g I-TEQ/year]

Type of Vehicle \ Type of Fuel	LP	ULP	Diesel	LPG/CNG/DF	TOTAL
Passenger vehicles	0.13	0.13	0.02	0.02	0.29
ADR27 (non-catalyst PCs)	*0.13*	*0.03*	-	*0.01*	*0.17*
ADR37 (Catalyst PCs)	-	*0.10*	-	*0.01*	*0.11*
Motorcycles	0.00	0.00	-	-	0.00
Light commercials	0.03	0.02	0.04	0.01	0.10
Rigid trucks	0.00	0.00	0.06	0.00	0.06
Articulated trucks	0.00	-	0.09	-	0.09
Non-freight carrying trucks	0.00	-	0.00	-	0.00
Buses	0.00	0.00	0.02	0.00	0.02
Total vehicles	0.17	0.15	0.21	0.03	**0.55**

Table B.2 – Maximum total dioxins emissions based on ABS Fuel Consumption Data [g I-TEQ/year]

Type of Vehicle \ Type of Fuel	LP	ULP	Diesel	LPG/CNG/DF	TOTAL
Passenger vehicles	5.83	0.59	0.19	0.11	6.72
ADR27 (non-catalyst PCs)	*5.83*	*0.34*	-	*0.08*	*6.25*
ADR37 (catalyst PCs)	-	*0.25*	-	*0.03*	*0.27*
Motorcycles	0.05	0.01	-	-	0.06
Light commercials	1.52	0.24	0.34	0.08	2.18
Rigid trucks	0.12	0.00	2.92	0.00	3.05
Articulated trucks	0.00	-	4.56	-	4.56
Non-freight carrying trucks	0.01	-	0.05	-	0.06
Buses	0.01	0.00	0.78	0.00	0.80
Total vehicles	7.55	0.84	8.65	0.20	**17.25**

Table B.3 – Minimum total dioxins emissions based on DITR Fuel Consumption Data [g I-TEQ/year]

Type of Vehicle \ Type of Fuel	LP	ULP	Diesel	LPG/CNG/DF	TOTAL
Passenger vehicles	0.22	0.12	0.03	0.01	0.38
ADR27 (non-catalyst PCs)	*0.22*	*0.03*	-	*0.01*	*0.26*
ADR37 (catalyst PCs)	-	*0.09*	-	*0.01*	*0.10*
Motorcycles	0.00	0.00	-	-	0.00
Light commercials	0.06	0.02	0.05	0.01	0.13
Rigid trucks	0.00	0.00	0.07	0.00	0.08
Articulated trucks	0.00	-	0.11	-	0.11
Non-freight carrying trucks	0.00	-	0.00	-	0.00
Buses	0.00	0.00	0.02	0.00	0.02
Total vehicles	0.28	0.15	0.25	0.02	**0.70**

Table B.4 – Maximum total dioxins emissions based on DITR Fuel Consumption Data [g I-TEQ/year]

Type of Vehicle \ Type of Fuel	LP	ULP	Diesel	LPG/CNG/DF	TOTAL
Passenger vehicles	9.97	0.57	0.23	0.08	10.85
ADR27 (non-catalyst PCs)	*9.97*	*0.33*	-	*0.06*	*10.36*
ADR37 (catalyst PCs)	-	*0.24*	-	*0.02*	*0.26*
Motorcycles	0.09	0.01	-	-	0.10
Light commercials	2.60	0.23	0.41	0.07	3.31
Rigid trucks	0.21	0.00	3.51	0.00	3.73
Articulated trucks	0.00	-	5.48	-	5.48
Non-freight carrying trucks	0.02	-	0.06	-	0.08
Buses	0.02	0.00	0.93	0.00	0.96
Total vehicles	12.91	0.82	10.40	0.16	**24.28**