



Appendix 2 Part 1
Calculation data for the Air Quality Model

Emission factor average aircraft (kg/LTO)

	Fuel	SO2	CO	Nox	NM VOC	CO2
LTO Average fleet	2500	2.5	50	41	15	7900
LTO old fleet	2400	2.4	101	24	66	7560
Cruise (kg/ton)		1	5	17	2.7	3150

Emission factors cars		Driving Speed	Stopping Time
		Driving 50 km/h	idling
	Car Type	g/km	g/h
CO	light cars gasol	10.4	229
	ligt diesel	0.8	10
	light heavy	5	339
	heavy vehicles	7.3	94.6
	Buses	4.2	94
NOx	light cars gasol	1.93	4.7
	ligt diesel	0.85	5
	light heavy	6.45	12.3
	heavy vehicles	15.25	55
	Buses	13.5	55
Particulates	light cars gasol	0.35	2.62
	ligt diesel	0.2	50
	light heavy	0.45	2.57
	heavy vehicles	1.6	50
	Buses	1.6	50
VOC	light cars gasol	0.1	21.1
	ligt diesel	0.05	5
	light heavy	0.01	30.7
	heavy vehicles	0.02	12.6
	Buses	0.02	12.6
SO2	light cars gasol	0.01	0.01
	ligt diesel	10	8
	light heavy	12	0.02
	heavy vehicles	18	12
	Buses	18	12



Type of car	Fraction	N passengers	N cars
private & taxi (gasoline)	0.07	118	59
light diesel (taxi)	0.05	85	42
light heavy (mini buses)	0.48	812	90
heavy vehicles (buses)	0.4	677	27
Lorries			10
Total	1	1692	229

Total emissions peak hour (kg/h)					
Driving 50 km/h	Nox	CO	VOC	SO2	Particle
Private cars	5.7	30.8	0.3	0.0	1.0
Taxis	1.8	1.7	0.1	21.2	0.4
Mini buses	29.1	22.6	0.0	54.1	2.0
Large buses	20.6	9.9	0.0	24.4	2.2
Lorries	6.8	2.1	0.0	9.0	0.8
Idling					
Private cars	0.3	13.6	1.2	0.0	0.2
Taxis	0.2	0.4	0.2	0.3	2.1
Mini buses	1.1	30.6	2.8	0.0	0.2
Large buses	1.5	2.6	0.3	0.3	1.4
Lorries	0.6	0.9	0.1	0.1	0.5
Tot. Emissions/Driving 50Km/h	64.0	67.0	0.5	108.7	6.5
Tot. Emissions/Idling Mode	3.6	48.1	4.7	0.8	4.4
Total emissions	67.6	115.1	5.2	109.5	10.8

Aircraft Operation			
Cairo emissions winter (kg/season)			
	HC	CO	NOx
Arrival	841	4942	5256
tax-in	7360	18828	1756
tax-out	9689	24785	2311
Takeoff	1007	1682	21350



		Concentrations (µg/m ³)				
Average	Contribution from	NO ₂	CO	HC	SO ₂	Particles
Annual average	Traffic along road	18	19	0	30	2
	At Terminal building	30	533	1	15	2
	At end of runway	5	34	3		
Max hourly peak traffic	Traffic along road	71	74	1	121	7
	At Terminal building	304	5072	88	216	93
	At end of runway	250	600	25		



Simple Gaussian Point Source model

x = distance from stack (m)
 h= effective plume height (stack)
 (M)
 Q= emission rate (kg/h)
 WS= wind speed (m/s)

For 3 classes of stability:

U = unstable (day time)
 N = near neutral (windy overcast)
 S = stable , night time low winds

24h to 1 h conversion	
obs 24 h av	90
1 h aver =	170

Estimated center line concentration, Conc (ug/m3), at surface level.

input data

x (m)	h (m)	Q (kg/h)	WS (m/s)	sigy			sigz			exph			Conc (ug/m3)		
				U	N	S	U	N	S				U	N	S
50	25	120	5	10.1	5.0	3.2	3.8	2.3	1.9	0.00	0.00	0.00	0.00	0.00	0.00
100	25	120	5	18.7	8.8	5.0	7.7	4.8	2.8	0.00	0.00	0.00	73.37	0.05	0.00
200	25	120	5	34.6	15.2	7.8	15.6	7.2	4.1	0.28	0.00	0.00	1081.79	46.95	0.00
500	25	120	5	78.2	31.7	14.2	39.6	12.5	6.7	0.82	0.13	0.00	559.58	720.18	0.90
750	25	120	5	112.2	43.9	18.5	59.9	15.9	8.4	0.92	0.29	0.01	288.50	883.44	6.71
1000	25	120	5	145.0	55.3	22.3	80.4	18.9	9.8	0.95	0.42	0.04	173.10	846.12	15.84
2000	25	120	5	268.7	96.2	35.0	163.0	28.7	14.4	0.99	0.68	0.22	47.78	524.69	38.75
5000	25	120	5	607.4	200.3	63.4	415.0	49.7	23.8	1.00	0.88	0.58	8.38	187.39	33.66
10000	25	120	5	1125.5	348.7	99.5	841.6	75.4	34.9	1.00	0.95	0.77	2.23	76.26	19.66
20000	25	120	5	2085.8	607.1	156.2	1706.7	114.2	51.0	1.00	0.98	0.89	0.59	29.81	9.81



Ground level concentrations with building turbulence

<i>input data</i>																	
x	h	Q	WS	sigy				sigz				exph					
(m)	(m)	(kg/h)	(m/s)	U	N	S	BTY	U	N	NBT	S	U	N	NBT	S	U	S
50	2	60	3	110.1	105.0	103.2	100.0	3.8	2.3	3.0	1.9	0.87	0.68	0.80	0.57	3682.91	258.46
100	2	60	3	118.7	108.8	105.0	100.0	7.7	4.8	5.4	2.8	0.97	0.92	0.93	0.77	1872.25	233.75
300	2	60	3	149.7	121.1	110.2	100.0	23.5	9.2	9.9	5.1	1.00	0.98	0.98	0.93	499.05	146.14
500	2	60	3	178.2	131.7	114.2	100.0	39.6	12.5	13.2	6.7	1.00	0.99	0.99	0.96	249.44	110.09
1000	2	60	3	245.0	155.3	122.3	100.0	80.4	18.9	19.6	9.8	1.00	0.99	0.99	0.98	89.57	71.91
1500	2	60	3	308.0	176.4	129.0	100.0	121.5	24.1	24.8	12.3	1.00	1.00	1.00	0.99	47.12	54.95
2000	2	60	3	368.7	196.2	135.0	100.0	163.0	28.7	29.4	14.4	1.00	1.00	1.00	0.99	29.36	44.99
3000	2	60	3	485.5	233.1	145.5	100.0	246.5	36.6	37.3	18.0	1.00	1.00	1.00	0.99	14.74	33.51
4000	2	60	3	598.0	267.5	154.9	100.0	330.5	43.5	44.2	21.1	1.00	1.00	1.00	1.00	8.93	26.92
5000	2	60	3	707.4	300.3	163.4	100.0	415.0	49.7	50.4	23.8	1.00	1.00	1.00	1.00	6.01	22.59

Conc (ug/m3)			
U	N	S	NBT
3682.91	5011.34	258.46	4522.52
1872.25	3123.02	233.75	2795.49
499.05	1548.07	146.14	1447.85
249.44	1058.75	110.09	1006.37
89.57	597.00	71.91	576.90
47.12	412.79	54.95	401.77
29.36	312.65	44.99	305.58
14.74	206.55	33.51	202.87
8.93	151.50	26.92	149.21
6.01	118.09	22.59	116.53





