

## ملحق 2 الجزء الأول

معاملات الانبعاث المتوسطة للطائرات  
Emission factor average aircraft (kg/LTO)

	Fuel	SO <sub>2</sub>	CO	Nox	NM VOC	CO <sub>2</sub>
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

## بيانات نموذج جودة الهواء

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
	light 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
	light 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
	light 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
	light diesel	0.05	5
	light heavy	0.01	30.7
	heavy vehicles	0.02	12.6
	Buses	0.02	12.6
SO <sub>2</sub>	light cars gasol	0.01	0.01
	light 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
<b>Total</b>	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
<b>Tot. Emissions/Driving 50Km/h</b>	<b>64.0</b>	<b>67.0</b>	<b>0.5</b>	<b>108.7</b>	<b>6.5</b>
<b>Tot. Emissions/Idling Mode</b>	<b>3.6</b>	<b>48.1</b>	<b>4.7</b>	<b>0.8</b>	<b>4.4</b>
<b>Total emissions</b>	<b>67.6</b>	<b>115.1</b>	<b>5.2</b>	<b>109.5</b>	<b>10.8</b>

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



Average	Contribution from	Concentrations ( $\mu\text{g}/\text{m}^3$ )				
		NO <sub>2</sub>	CO	HC	SO <sub>2</sub>	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

<b>24h to 1 h conversion</b>	
obs 24 h av	90
<b>1 h aver =</b>	<b>170</b>

**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





