



3.2.2.3 Small-Scale Industry and Commercial Emissions

The City of Toronto has identified additional small-scale industrial and commercial sources that could release PAC contaminants. These include:

- Autobody Shops
- Dry Cleaners; and
- Commercial Solvent and Producers Users.

A top down approach was used to estimate the emissions from these small-scale industrial and commercial operations for Tier III. Population based emission factors were obtained from the Great Lakes Commission (<http://www.glc.org/>) for these various industries. Using the population of Toronto (2,631,725) city-wide emissions were calculated for various PACs. The City provided employment information (e.g., number of employees) and location of these small industrial and commercial operations.

The PAC emissions were geographically distributed among the industries based on number of employees, with a cut off of five (5) employees. Facilities with employees under five were assumed to have negligible emissions. The emissions due to natural gas combustion were accounted for via natural gas usage.

The above was expanded to Tier II based on urban population by prorating according to population density in the various grid cells. The emissions allocated to small-scale industry and commercial operations for Tier II and Tier III are presented in Table 3-9.

3.2.2.4 Total Commercial/Residential Emissions

The commercial and residential natural gas emissions, other heating sources and lawn and garden equipment emissions were then summed to determine the final commercial and residential dataset in Table 3-10. Combustion by-product (NO_x, CO, etc) emissions are the dominant species, followed by VOC's and toluene from commercial solvents users.



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Table 3-9: Annual 2006 Emissions from Small Industrial/Commercial Sources (Tonne/yr)

Source Group	Tier II Residential/Commercial	Tier III Residential/Commercial
Nitrogen Oxides	-	-
Carbon Monoxide	-	-
Sulphur Dioxide	-	-
PM _{2.5}	-	-
PM ₁₀	-	-
VOCs	25,198	5,015
Formaldehyde	12	4
Acetaldehyde	-	-
Acrolein	-	-
1,3-Butadiene	-	-
Benzene	0.046	0.016
Toluene	4,205	1,507
1,4-Dichlorobenzene	342	123
PAHs (as B[a]Ps)	-	-
Chloromethane	-	-
Dichloromethane	388	139
Chloroform	9.6	3.5
Carbon tetrachloride	0.000004	0.000014
Vinyl Chloride	-	-
1,2-Dichloroethane	0.045	0.016
Trichloroethylene	4.7	1.7
Tetrachloroethylene	886	318
Ethylene dibromide	-	-
Lead	-	-
Cadmium	-	-
Chromium	-	-
Nickel compounds	-	-
Mercury	-	-
Manganese	-	-
Total	31,047	7,111

Note: NO_x emissions represented as NO₂ equivalent.

PM_{2.5} emissions are included in PM₁₀ emissions since the PM emissions are all of a fine fraction (i.e., less than 2.5 µm).



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Table 3-10: Annual 2006 Emissions from Commercial/Residential Sources (Tonne/yr)

Source Group	Tier II Residential/Commercial	Tier III Residential/Commercial
Nitrogen Oxides	17,261	7,397
Carbon Monoxide	16,026	4,020
Sulphur Dioxide	343	86
PM _{2.5}	5,883	603
PM ₁₀	5,883	608
VOCs	31,518	6,265
Formaldehyde	22	9
Acetaldehyde	-	-
Acrolein	2	1
1,3-Butadiene	-	-
Benzene	240	0.14
Toluene	4,298	1,509
1,4-Dichlorobenzene	343	123
PAHs (as B[a]Ps)	0.035	0.000069
Chloromethane	-	-
Dichloromethane	388	139
Chloroform	10	3
Carbon tetrachloride	0.000004	0.0000014
Vinyl Chloride	0	0
1,2-Dichloroethane	0.045	0.016
Trichloroethylene	4.7	1.7
Tetrachloroethylene	887	318
Ethylene dibromide	-	-
Lead	0.11	0.034
Cadmium	0.14	0.07
Chromium	0.17	0.09
Nickel compounds	0.25	0.13
Mercury	0.046	0.016
Manganese	0.1	0.025
Total	83,110	21,083

Note: NO_x emissions represented as NO₂ equivalent.

PM_{2.5} emissions are included in PM₁₀ emissions since the PM emissions are all of a fine fraction (i.e., less than 2.5 µm).