



Tracking and Reducing Chemicals in Toronto

8th Annual ChemTRAC Report

December 2018

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Chapter 1: Improving Health by Reducing Chemicals In The Environment

In an urban environment like Toronto, the public's health may be affected by a number of environmental factors, including chemicals that are released to the air, water and land. Exposure to these chemicals can occur in our homes, workplaces and outside.

Smog-forming pollutants and other chemical substances come from different sources. Some come from sources outside the city, others from inside the city itself. Production of electricity, heating of buildings, transportation and commercial and industrial facilities contribute to air quality. Overall, air quality is impacted by the sources that exist in different neighbourhoods and how weather patterns carry pollutants in the air.

People can come in contact with chemicals outdoors and indoors, in homes and workplaces. Prolonged exposure to toxic substances, and in some cases even at low levels, may cause a range of adverse health effects.

Through evidence-based research, 25 priority chemicals have been identified as having adverse impacts on health. The ChemTRAC program was developed to help better understand sources of these 25 priority chemicals in Toronto and to encourage pollution prevention initiatives and measures to protect health. As a part of Toronto's Environmental Reporting and Disclosure Bylaw (Municipal Code Chapter 423), ChemTRAC collects information from businesses and institutions in Toronto. Programs in Canada and other countries that are comparable to ChemTRAC have been found to have an impact on reducing priority chemicals used and released from facilities.

The ChemTRAC program is divided into three main areas:

- The Environmental Reporting and Disclosure Bylaw, which requires businesses to track and report their manufacturing, use and release of priority chemicals;
- The analysis and release of chemical data; and,
- The promotion of pollution prevention initiatives and innovation.

ChemTRAC is a release inventory, meaning it is a database that collects information on air pollution sources and their release within the local air shed. Data collected are used to better understand contaminant trends over time, highlight key sources of chemicals, and support studies that can model pollutant patterns.

This report contains information reported by facilities that operated in Toronto during the 2017 calendar year, which was reported in 2018.

Chapter 2: ChemTRAC 2017 Data Highlights

Facility Representation by Sector

The Environmental Reporting and Disclosure Bylaw requires facilities in Toronto to report their use and release of the 25 priority chemicals annually, if they meet reporting requirements. In 2017, a total of almost 700 facilities reported on their operations. Table 1 shows the number of facilities within each industrial sector that reported information on their manufacture, use and release of these chemicals.

Table 1: Number of facilities that reported data on priority substances for 2017 operations.

Sector	Number of facilities that reported in 2017
Automotive repair and maintenance	92
Chemical wholesale	3
Computer and electronic product manufacturing	18
Dry cleaning and laundry services	72
Electrical equipment, appliance and component manufacturing	18
Fabricated metal product manufacturing	74
Food, beverage and tobacco products manufacturing	64
Funeral services	6
Manufacturing	106
Medical and diagnostic laboratories	2
Non-metallic mineral product manufacturing	19
Paper product manufacturing	9
Power generation	2
Primary metal manufacturing	15
Printing and publishing	55
Waste management and remediation services	9
Water and wastewater treatment	7
Wood products manufacturing	42
All others	80
Total	693

Priority Substances Manufactured, Processed or Used

Table 2 shows the total chemical amounts reported as manufactured, processed or otherwise used for each priority substance in 2017. Approximately 70,000 tonnes of priority substances were reported in total. Volatile organic compounds (VOCs), particulate matter <2.5 µm (PM_{2.5}), manganese, nitrogen oxides (NO_x) and tetrachloroethylene (perc) were the priority substances with the largest reported amounts.

Table 2: Total amounts of priority substances manufactured, processed, or otherwise used in 2017.

Priority Substance	Manufactured (kg)	Processed (kg)	Otherwise Used (kg)
Acetaldehyde	1,028	-	-
Acrolein	-	-	-
Benzene	-	-	-
1,3-Butadiene	-	-	-
Cadmium	0	4,981	186
Carbon Tetrachloride	-	-	-
Chloroform	139	254	3,404
Chromium, Hexavalent	-	90,684	672
Chromium, Non-Hexavalent	-	1,682,374	1,669
1,2-Dibromoethane	-	-	-
1,4-Dichlorobenzene	-	-	-
1,2-Dichloroethane	-	-	-
Dichloromethane	428	165,302	37,211
Formaldehyde	4,386	5,658	22,173
Lead	0	404,732	410,542
Manganese	-	3,334,352	4,062
Mercury	-	259	511
Nickel	-	1,918,008	1,118
NO _x	1,408,814	-	2,785
PAHs	67	656	-
PM _{2.5}	901,296	1,300,528	51
Tetrachloroethylene	-	-	627,287
Trichloroethylene	1	16,369	13,487
Vinyl Chloride	1	-	-
VOCs	560,327	26,224,079	6,005,142
Total	2,930,628	61,945,317	4,720,251

(-) represents a null value.

Priority Substances Released to the Environment

Similar to data from 2015 and 2016 operations, the total releases of priority substances represents a small proportion (about 10 per cent overall) of the total amount reported as manufactured, processed or used by facilities. This proportion varies for each pollutant. Table 3 shows the total amounts released to air for each substance in 2017. Volatile organic compounds (VOCs), nitrogen oxides (NO_x), and PM_{2.5} were the priority substances with the largest reported amounts.

Table 3: Total amounts of priority substances released to air in 2017.

Priority Substance	Released to Air (kg)
VOCs	5,319,448
NO _x	1,399,028
PM _{2.5}	271,421
Trichloroethylene	24,387
Tetrachloroethylene	8,950
Formaldehyde	7,006
Dichloromethane	6,692
Acetaldehyde	1,028
Manganese	781
Chloroform	625
Chromium, Non-hexavalent	488
Nickel	486
Chromium, Hexavalent	297
Lead	289
PAHs	118
Vinyl chloride	1
Mercury	16
Cadmium	2
Total	7,041,163

Health Ranking of Substances

The health effect of a toxic chemical depends not only on its toxicity but also on the amount at which is present in the environment. A commonly used method to compare the health effects of substances with different toxicity is the use of Toxic Equivalent Potential (TEP). This method consists of multiplying the amount of the chemical by its chemical-specific TEP value. This provides a TEP Score that reflects both the amount and the toxicity of a substance. The substances can then be compared with each other to give a better indication of the relative health risk.

There are two sets of TEP values: one for cancer-related health effects and another for non-cancer health effects. Some of the ChemTRAC's 25 priority substances have the potential to cause both cancer and non-cancer health effects and therefore are assigned a TEP score for each category. Table 4 shows the releases to air ranked by the cancer TEP and Table 5 ranks the releases by non-cancer TEP.

Table 4: Reported quantities of priority substances released to air in 2017 ranked by Cancer toxic equivalent potential (TEP) score.

Priority Substance	Released to Air (kg)	Cancer TEP value	Cancer TEP Score
PAHs	118	6,300	743,400
Cadmium	2	26,000	52,000
Chromium, Hexavalent	297	130	38,571
Tetrachloroethylene	8,950	0.96	8,592
Lead	289	28	8,092
Nickel	486	2.8	1,360
Dichloromethane	6,692	0.2	1,338
Trichloroethylene	24,387	0.05	1,219
Chloroform	625	1.6	1,000
Formaldehyde	7,006	0.02	140
Acetaldehyde	1,028	0.01	10
Vinyl chloride	1	1.9	2

Table 5: Reported quantities of priority substances released to air in 2017 ranked by Non-Cancer toxic equivalent potential (TEP) score.

Priority Substance	Released to Air (kg)	Non-Cancer TEP value	Non-Cancer TEP Score
Lead	289	580,000	197,620,000
Mercury	16	5,000,000	80,000,000
VOCs	5,319,348	1.0	5,319,348
PM2.5	271,421	17	4,614,157
Cadmium	2	1,900,000	3,800,000
NOx	1,399,028	2.2	3,077,862
Chromium (total) *	785	3,100	2,433,500
Nickel	486	3,200	1,554,560
Manganese	781	780	609,414
Tetrachloroethylene	8,950	65	581,750
Formaldehyde	7,006	16	112,096
Dichloromethane	6,692	7.0	46,844
Trichloroethylene	24,387	0.63	15,364
Acetaldehyde	1,058	9.3	9,560
Chloroform	625	14	8,750
Vinyl chloride	1	69	69

* Includes both hexavalent and non-hexavalent chromium

Industry Contribution to Total Release

The information reported by businesses on operations that took place in 2017 can be summarized by industry. Table 6 shows the percentage contribution by industry sectors to 1) total release by mass, 2) Cancer TEP, and 3) Non-Cancer TEP.

Table 6: Sector contribution to Total Release (by mass), Cancer TEP and Non-Cancer TEP in 2017.

Sector^a	Percent Contribution to Total Release (by mass)^b	Percent Contribution to Cancer TEP^b	Percent Contribution to Non-Cancer TEP^b
Automotive	<1	<1	<1
Chemical Wholesale	5	<1	<1
Computer & Elect. Prod. Mfg	<1	<1	2
Dry Cleaning	<1	1	<1
Electrical Equip, Appl/Comp Mfg	<1	8	5
Fab Metal Prod Mfg	5	<1	<1
Food & Beverage	10	<1	<1
Funeral Services	<1	<1	17
Manufacturing	40	5	22
Medical	<1	<1	<1
Non Metallic Mineral Prod Mfg	2	<1	7
Paper Prod Mfg	4	<1	<1
Power Generation	2	<1	<1
Primary Metal Mfg	<1	<1	32
Printing	12	<1	<1
Waste Management	<1	80	<1
Wastewater Treatment	6	6	12
Wood Industries	2	0	<1
All other	8	<1	<1

^a Sectors are defined based on the North American Industry Classification System (NAICS)

^b <1 indicates a value less than one

Chapter 3: Distribution of Facilities in Toronto

Figure 1 shows the location of facilities that reported data to ChemTRAC for the 2017 reporting year. The reporting facilities are not uniformly distributed across the city, the majority are located in the non-residential areas. There are clusters of facilities in the North West part of the city.

Figure 1: Distribution of facilities within residential and non-residential areas that provided information on the manufacture, use or release of priority substances in 2017.

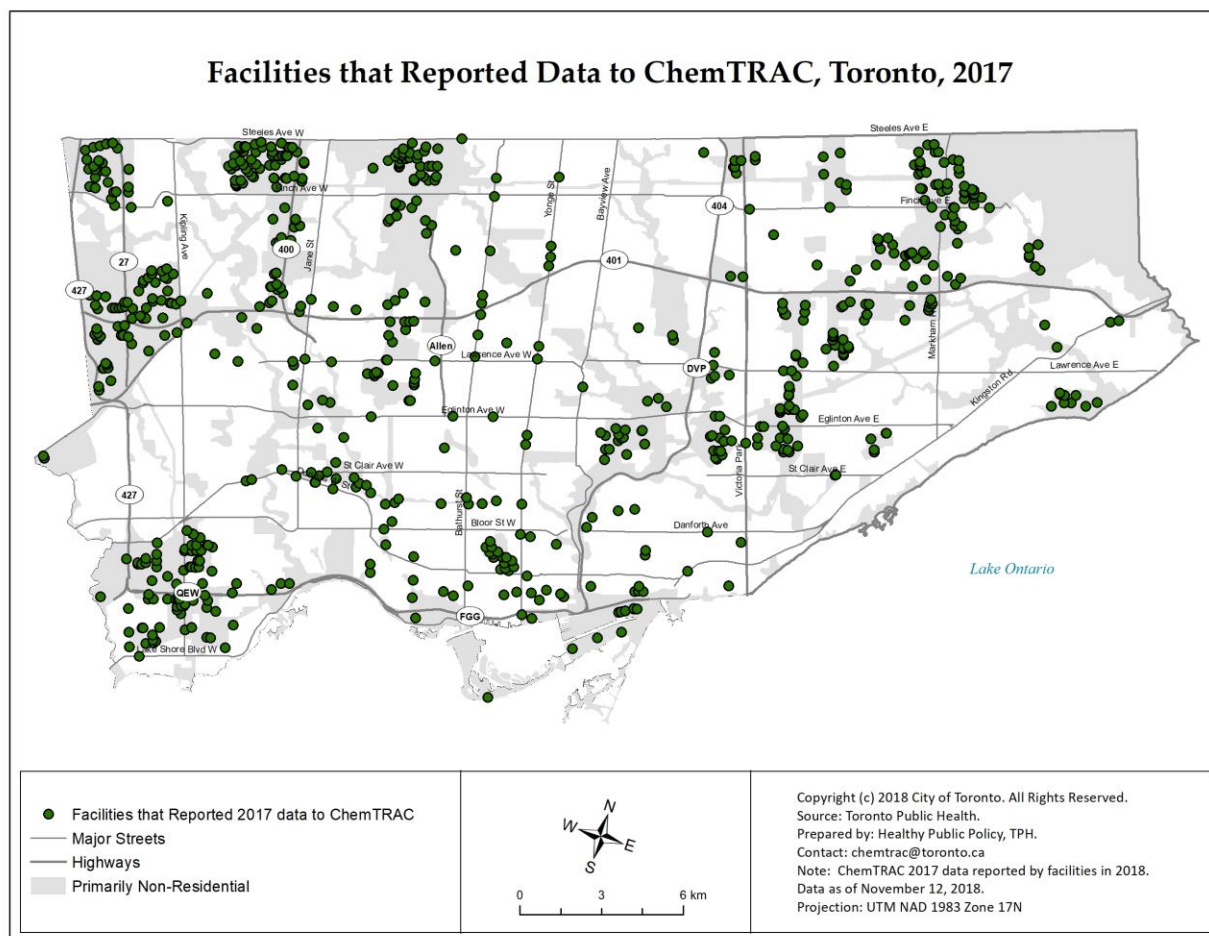


Figure 2 shows the location of the reporting facilities over a map of the Low Income Measure (LIM). The map shows that the majority of the facilities are located in areas of the city where more than 30% of the residents are below the LIM.

Figure 2: Distribution of facilities that provided information on the manufacture, use or release of priority substances in 2017 and socioeconomic status as represented by proportion of residents living at or below the 2013 Low Income Measure.

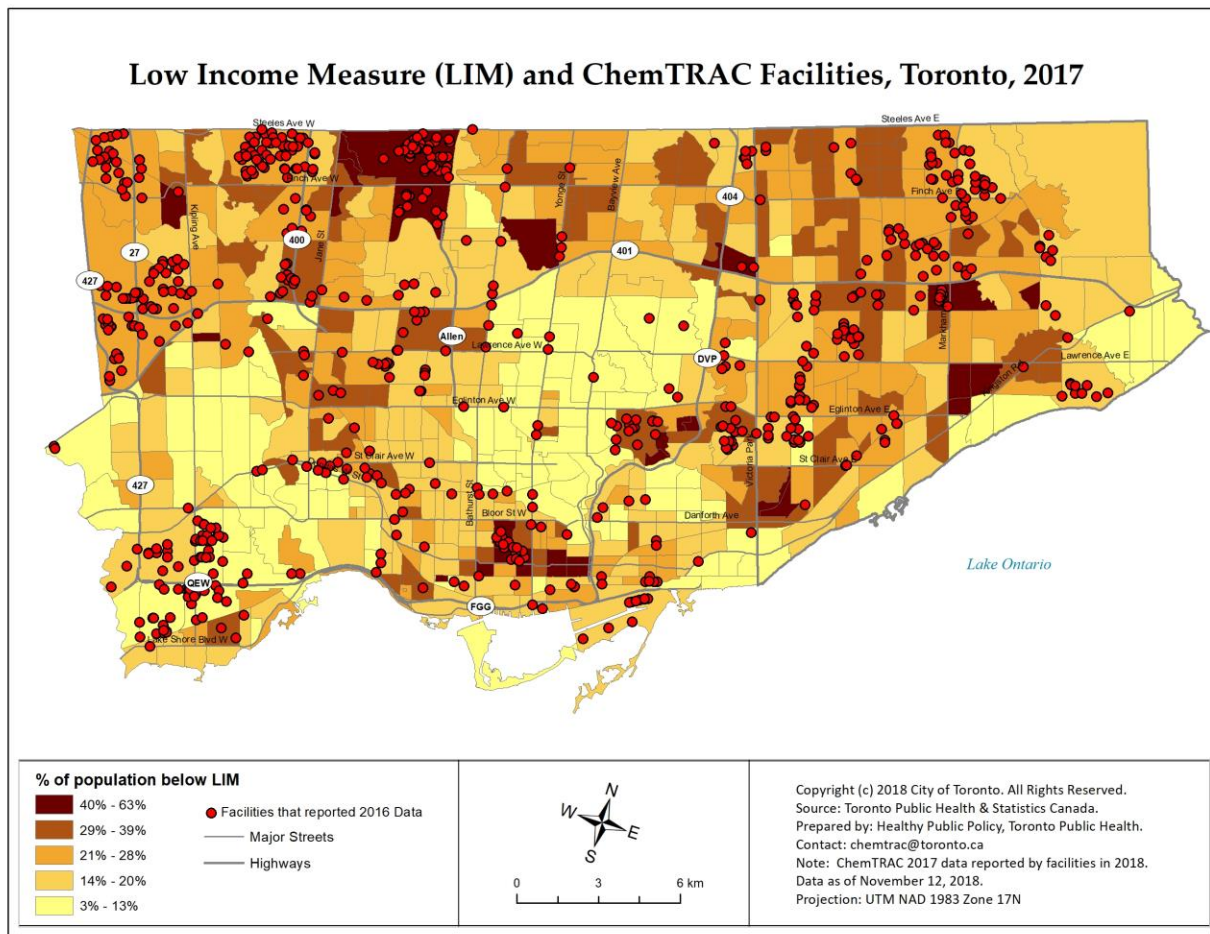


Figure 3 shows a map of the total Cancer Toxic Equivalent Potential of the reporting facilities. The size of each circle indicates the magnitude of the Cancer Toxic Equivalent potential score. Of the seven facilities with the highest scores, 3 are located in the North West, 3 along the shoreline, and one in the North East part of the city.

Figure 3: Location of air releases by Cancer TEP in 2017

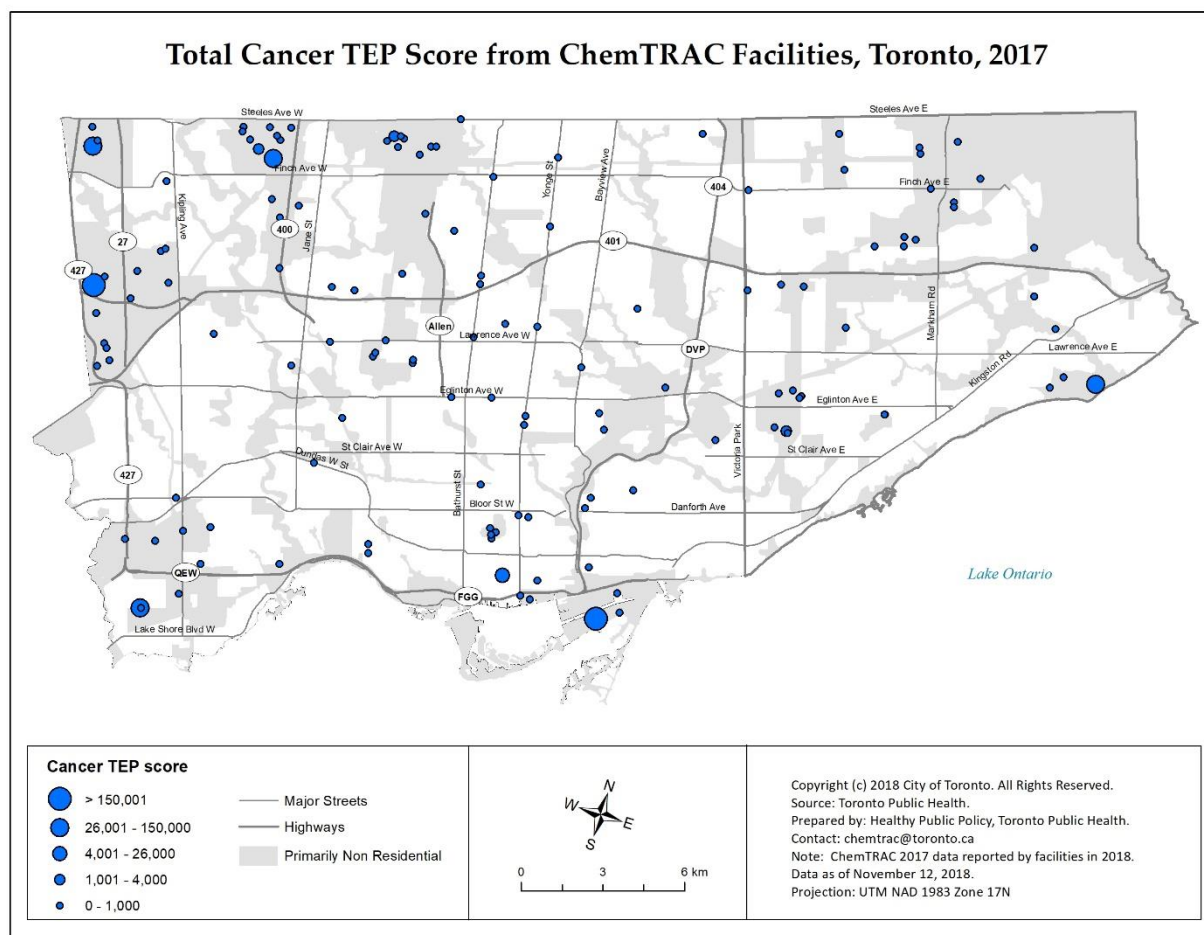
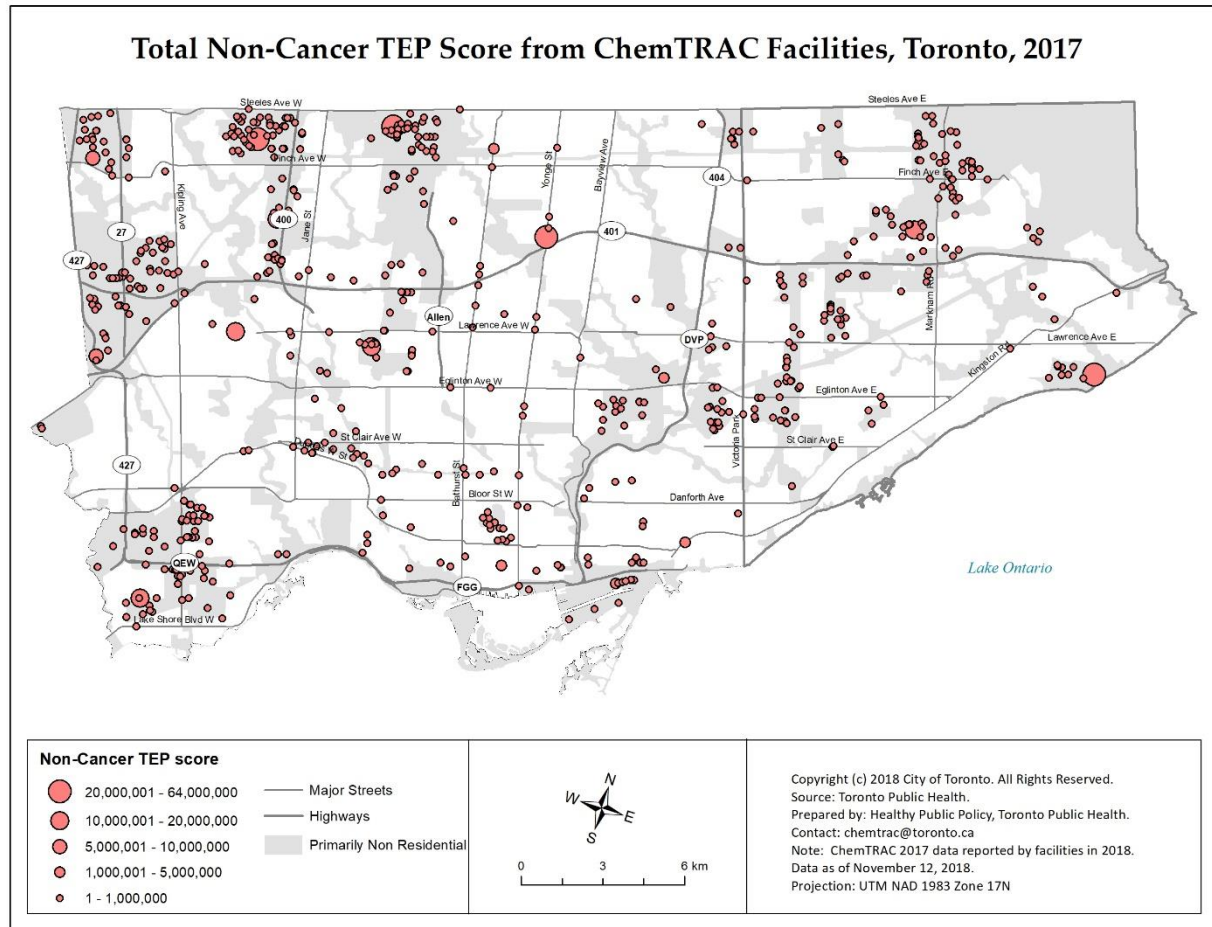


Figure 4 presents a map of the total Non-Cancer Toxic Equivalent Potential of the reporting facilities. The size of the circles indicates the non-Carcinogenic Toxic Equivalent potential score. The facilities with high score are located in non-residential areas. Of the ten facilities with the highest score, 6 are located in the North West, 3 on the shoreline, one in the North East, and one in the North York.

Figure 4: Location of air releases by Non-Cancer TEP in 2017



Chapter 4: Sector Quick Facts

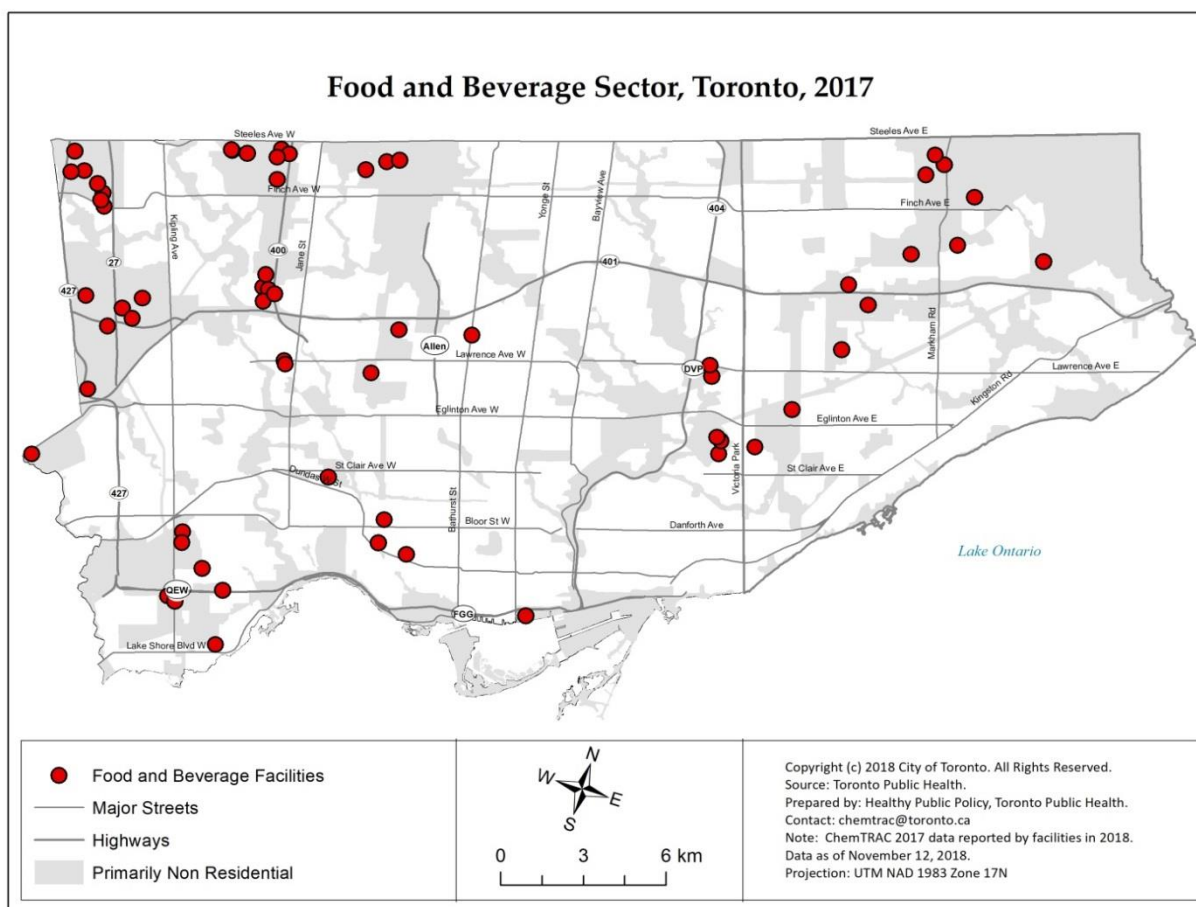
The information reported by businesses for the 2017 calendar year is summarized by industry type below.

Food and Beverage Manufacturing

Types of activities: meat processing, baking, fruit and vegetable canning, frozen food manufacturing and dairy product manufacturing, beverage manufacturing - soft drink, ice, and bottled water manufacturing, beer brewers and wine distillers, and tobacco manufacturing.

- Number of facilities that were required to report: 65
- Range in number of employees per facility: 1 to 741
- Total amount of chemicals released: 650 tonnes
- Total amount of chemicals manufactured, processed or used: 1,568 tonnes
- Number of priority substances reported: 6

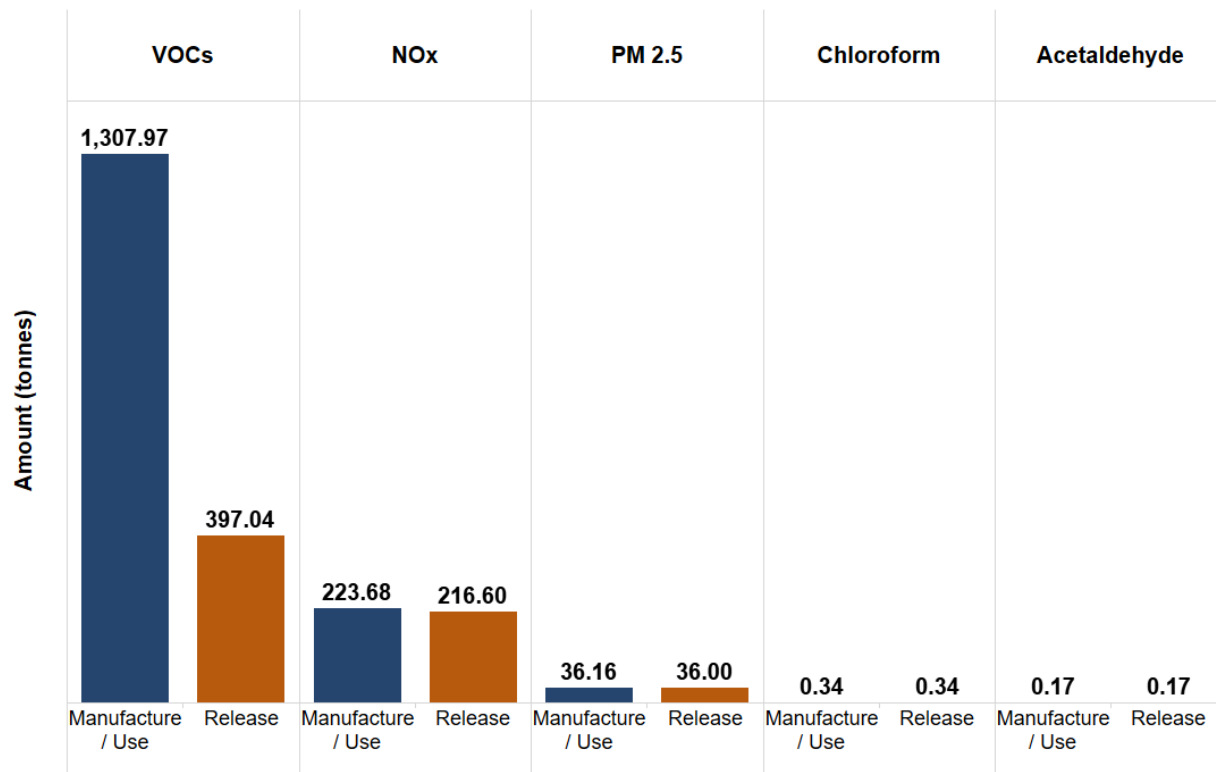
Figure 5: Location of facilities from Food and Beverage Sector in 2017



Top substances reported are:

- Volatile organic compounds (VOCs)
- Nitrogen oxides (NOx)
- Particulate matter 2.5 (PM_{2.5})
- Chloroform
- Acetaldehyde

Figure 6: Amount of substances reported by Food and Beverage facilities for 2017

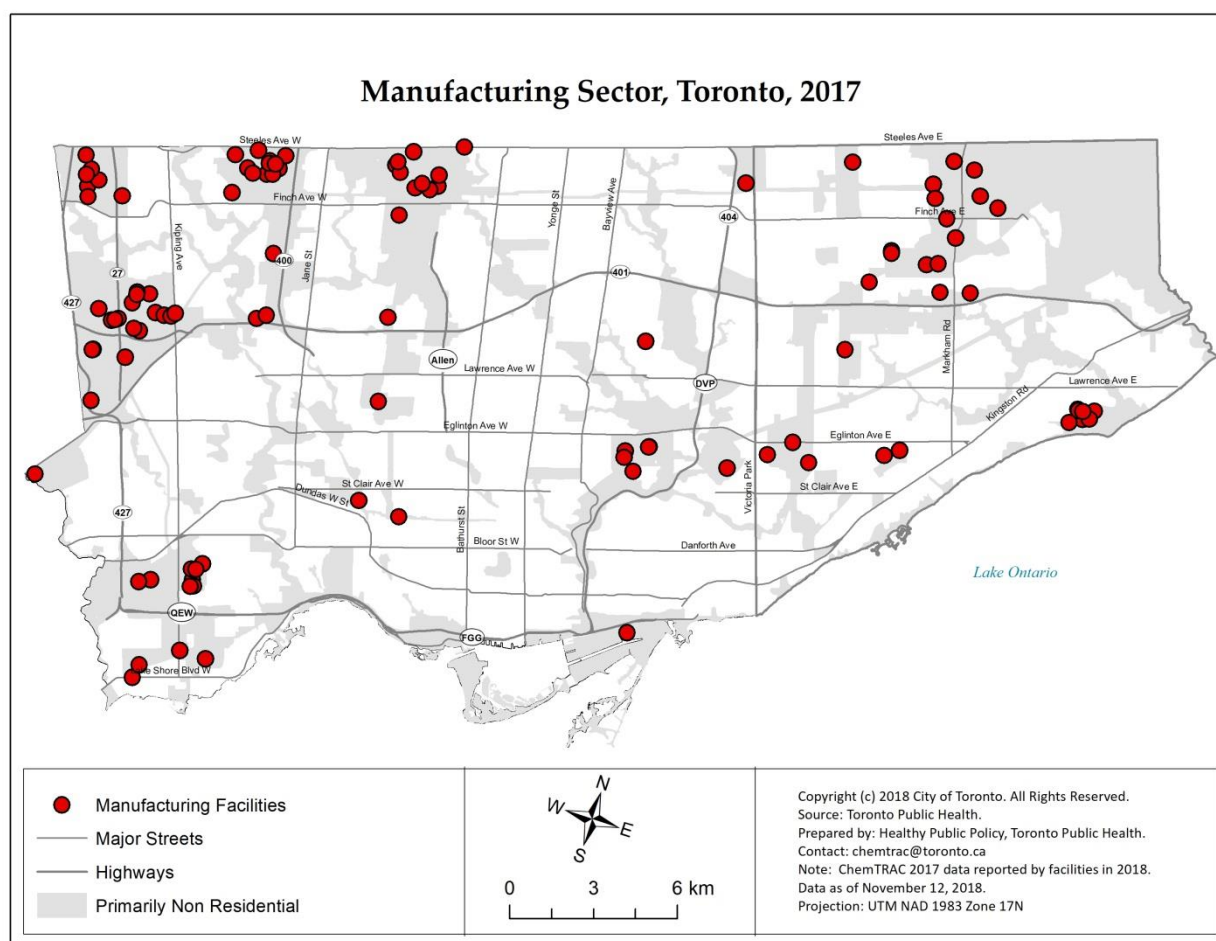


Manufacturing (including chemical and petroleum products)

Types of activities: manufacturing of basic chemicals, synthetic fibers, plastics, pigments, paints, fertilizers, drugs, cosmetics and soaps.

- Number of facilities that were required to report: 106
- Range in number of employees per facility: 2 to 1,456
- Total amount of chemicals released: 2,816 tonnes
- Total amount of chemicals manufactured, processed or used: 25,120 tonnes
- Number of priority substances reported: 17

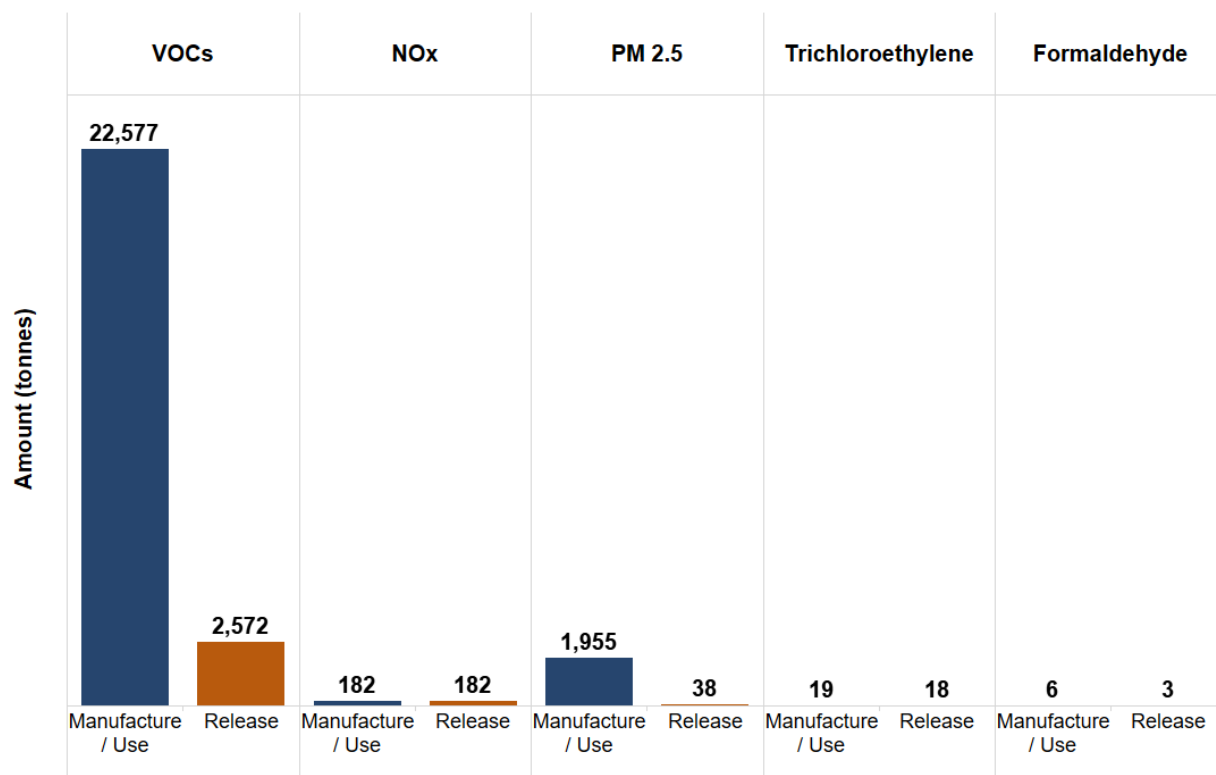
Figure 7: Location of facilities from Manufacturing Sector in 2017



Top substances reported are:

- Volatile organic compounds (VOCs)
- Nitrogen oxides (NO_x)
- Particulate matter 2.5 (PM_{2.5})
- Trichloroethylene
- Formaldehyde

Figure 8: Amount of substances reported by Manufacturing facilities for 2017

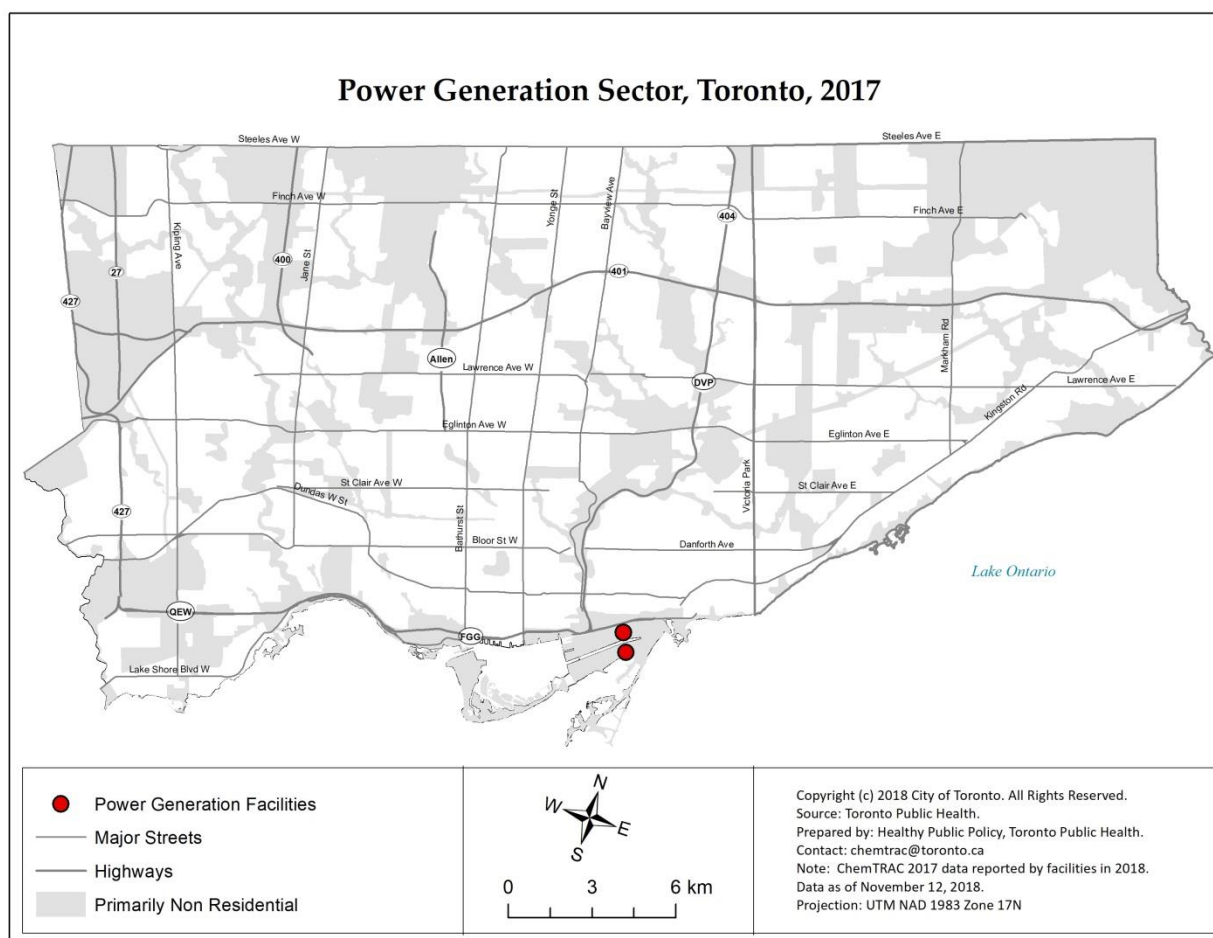


Power Generation

Types of activities: generation of bulk electric power.

- Number of facilities that were required to report: 2
- Range in number of employees per facility: 30 to 850
- Total amount of chemicals released: 150 tonnes
- Total amount of chemicals manufactured, processed or used: 155 tonnes
- Number of priority substances reported: 5

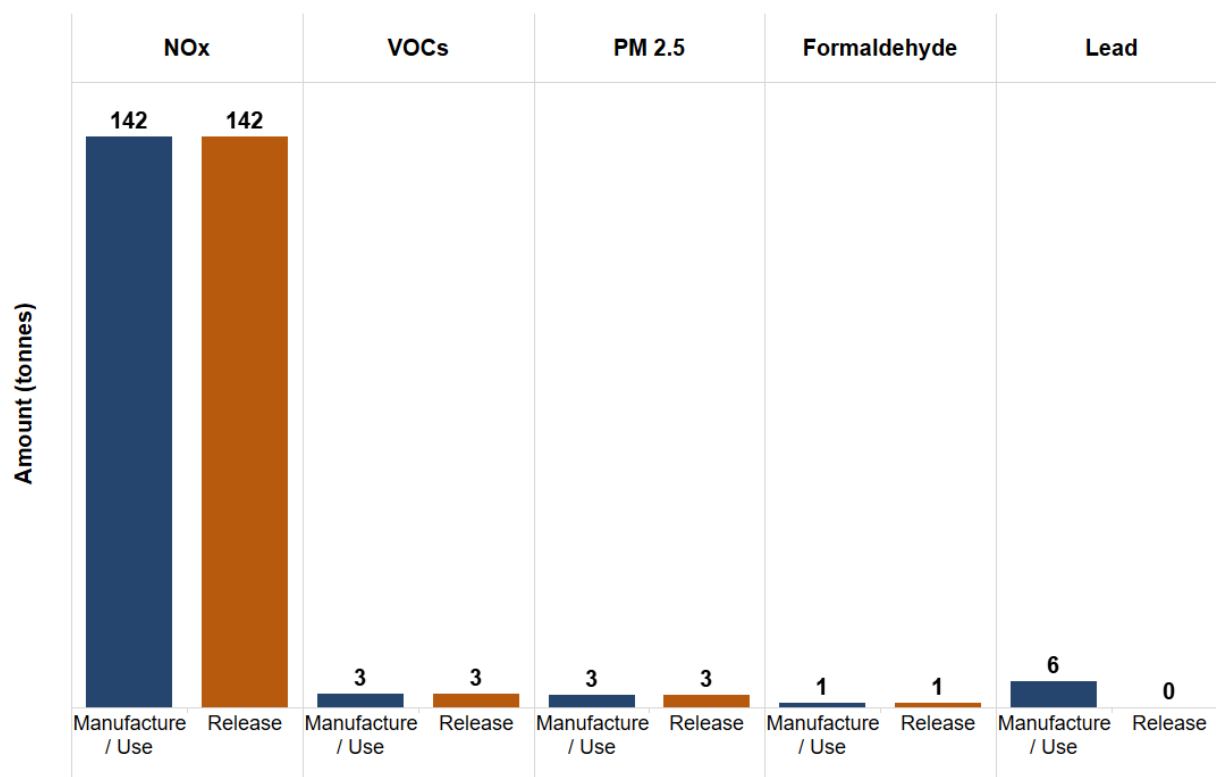
Figure 9: Location of facilities from Power Generation Sector in 2017



Top substances reported are:

- Nitrogen oxides (NO_x)
- Volatile organic compounds (VOCs)
- Particulate matter 2.5 (PM_{2.5})
- Formaldehyde
- Lead

Figure 10: Amount of substances reported by Power Generation facilities for 2017

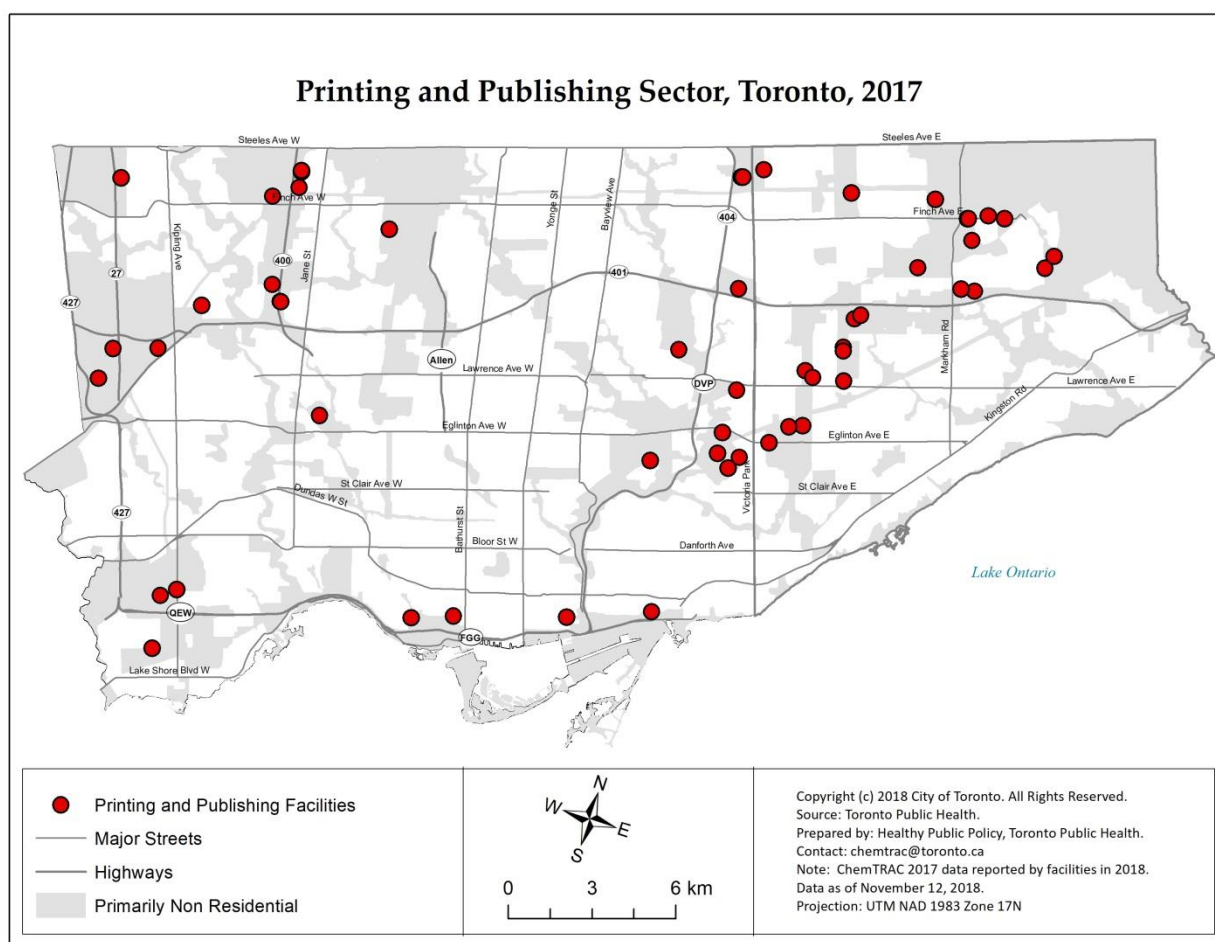


Printing and Publishing

Types of activities: printing newspapers, books, labels, business cards, food wrappers, etc.

- Number of facilities that were required to report: 55
- Range in number of employees per facility: 1 to 250
- Total amount of chemicals released: 871 tonnes
- Total amount of chemicals manufactured, processed or used: 1,253 tonnes
- Number of priority substances reported: 6

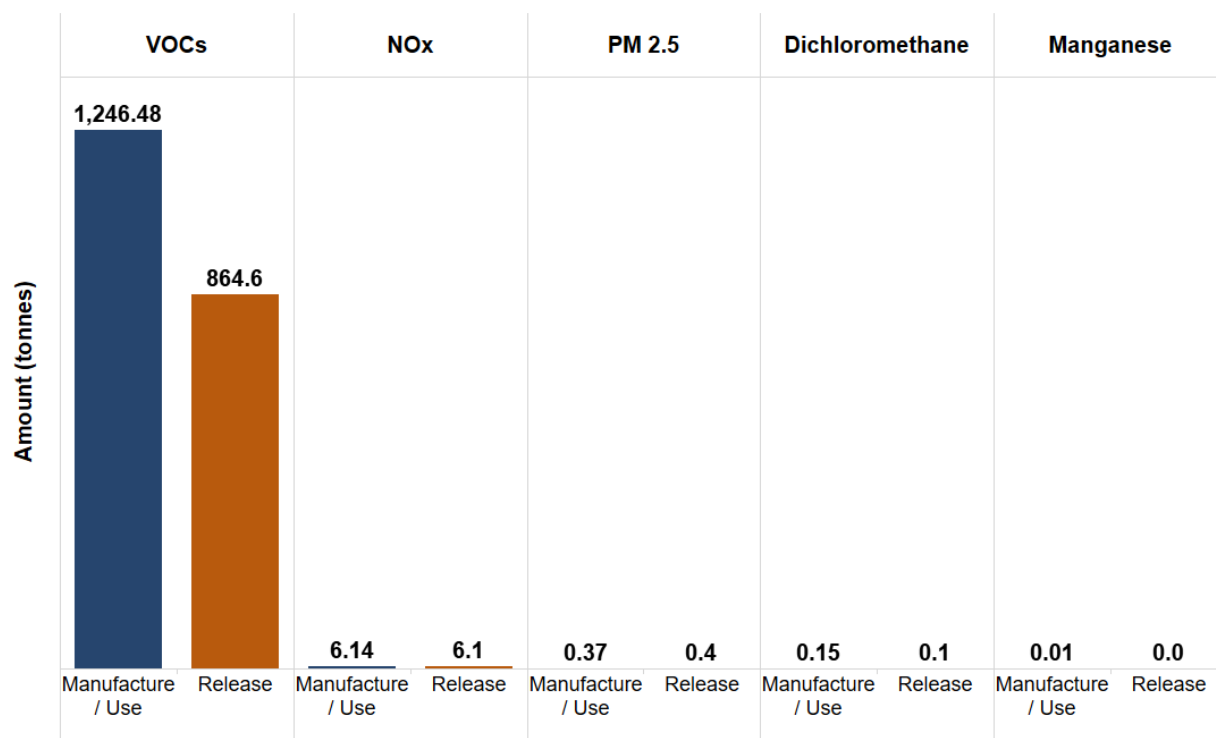
Figure 11: Location of facilities from Printing and Publishing Sector in 2017



Top substances reported are:

- Volatile organic compounds (VOCs)
- Nitrogen oxides (NOx)
- Particulate matter 2.5 (PM_{2.5})
- Dichloromethane
- Manganese

Figure 12: Amounts of substances reported by Printing and Publishing facilities for 2017

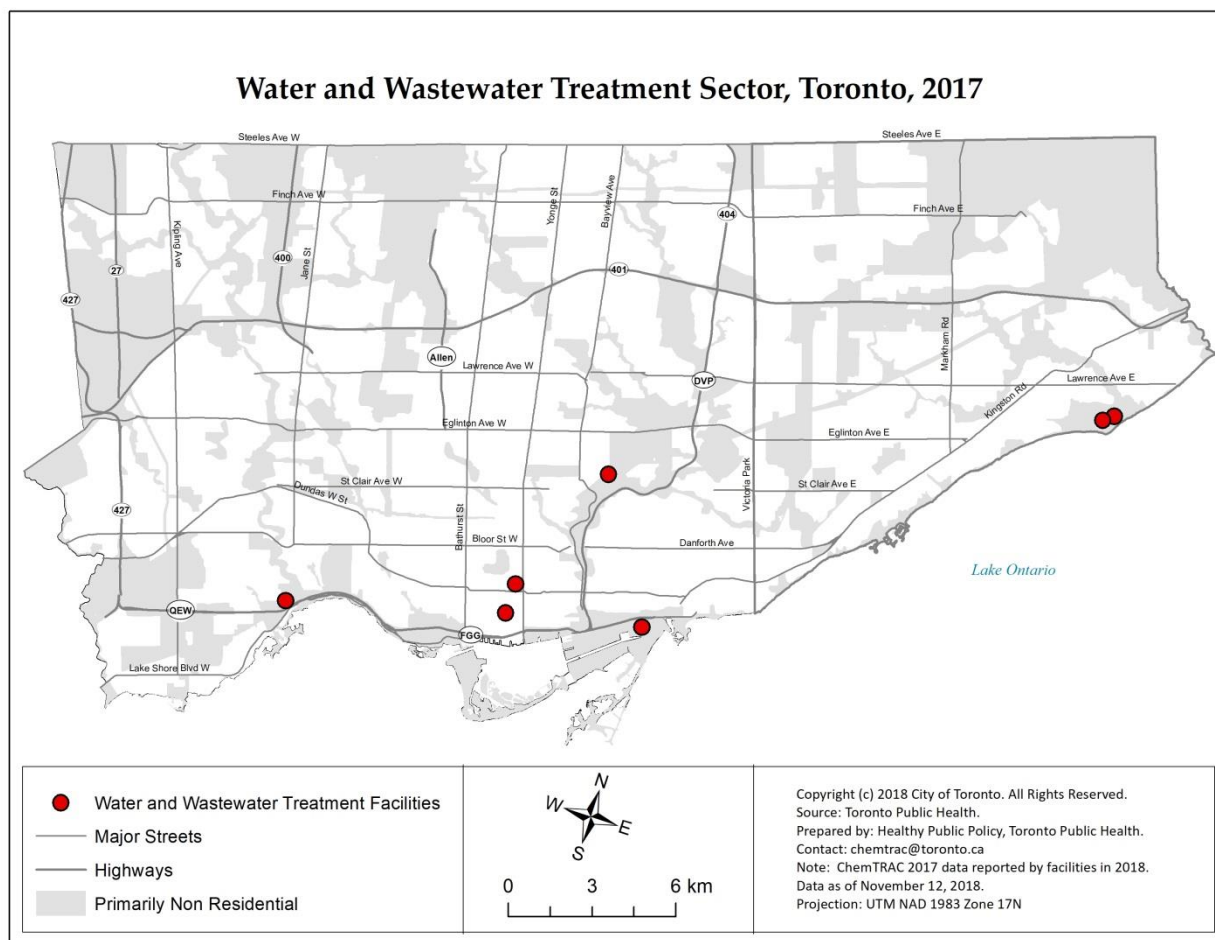


Water and Wastewater

Types of activities: water, wastewater and sewage treatment plants.

- Number of facilities that were required to report: 7
- Range in number of employees per facility: 5 to 174
- Total amount of chemicals released: 424 tonnes
- Total amount of chemicals manufactured, processed or used: 429 tonnes
- Number of priority substances reported: 8

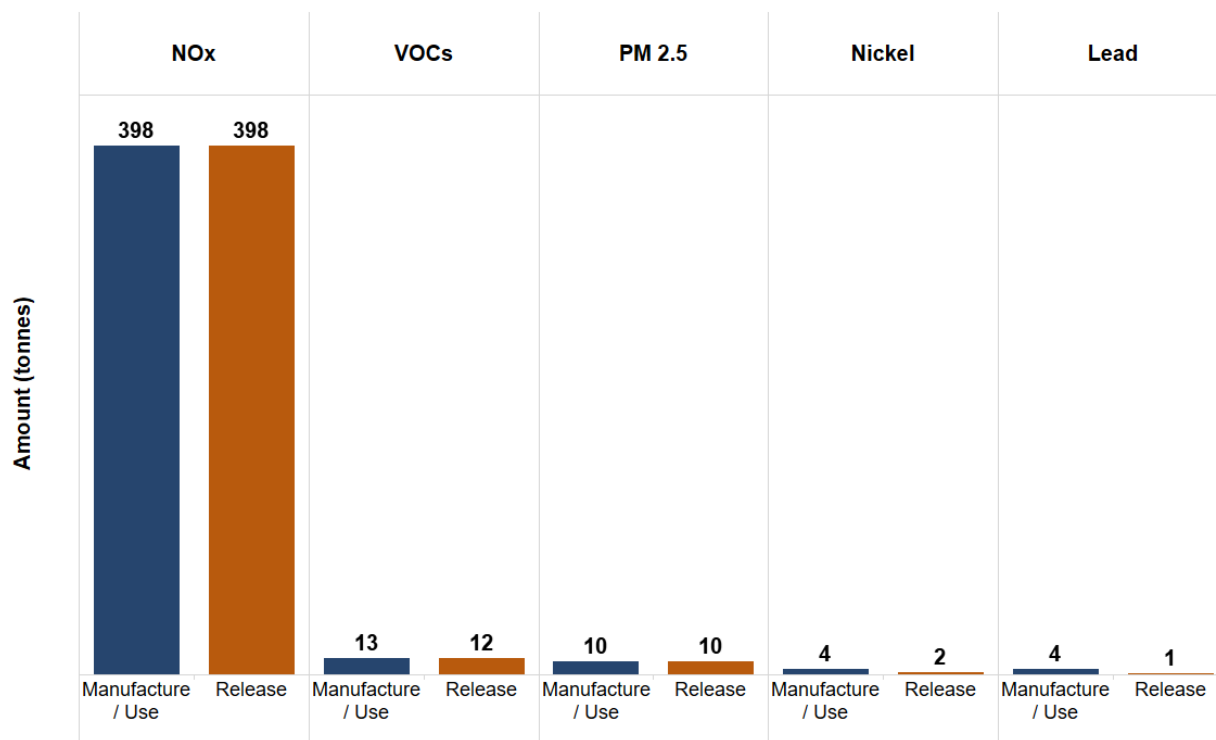
Figure 13: Location of facilities from Water and Wastewater Treatment Sector in 2017



Top substances reported are:

- Nitrogen oxides (NOx)
- Volatile organic compounds (VOCs)
- Particulate matter 2.5 (PM2.5)
- Nickel
- Lead

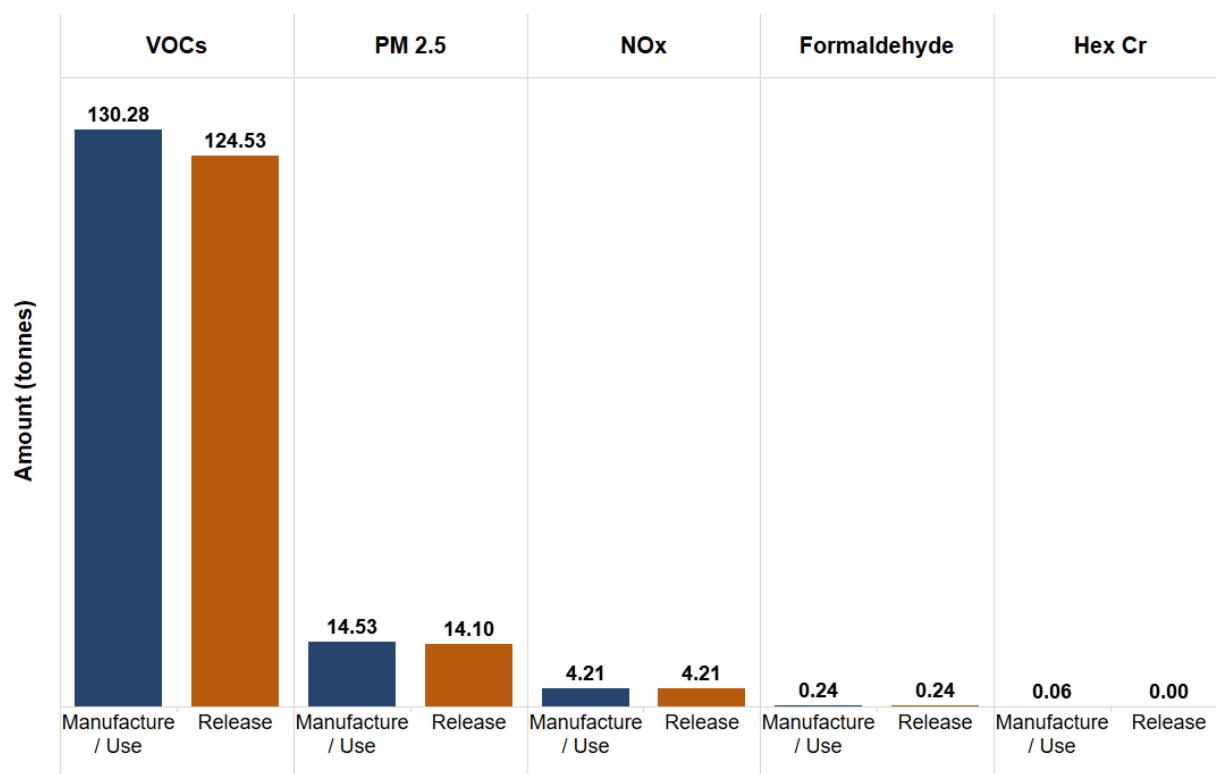
Figure 14: Amounts of substances reported by Water and Wastewater Treatment facilities for 2017



Top substances reported are:

- Volatile organic compounds (VOCs)
- Particulate matter 2.5 (PM_{2.5})
- Nitrogen oxides (NO_x)
- Formaldehyde
- Chromium Hexavalent

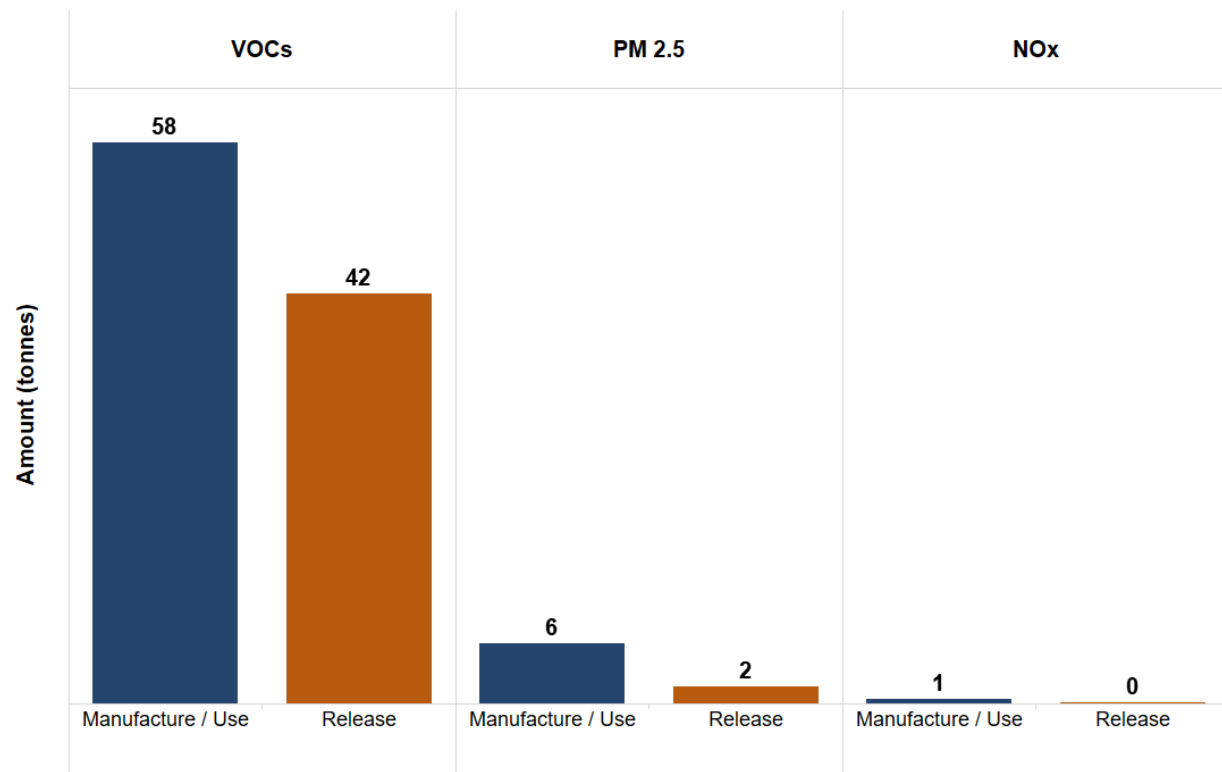
Figure 16: Amounts of substances reported by Wood Industries for 2017



Top substances reported are:

- Volatile organic compounds (VOCs)
- Particulate matter 2.5 (PM_{2.5})
- Nitrogen oxides (NO_x)

Figure 18: Amounts of substances reported by Autobody Refinishing facilities for 2017

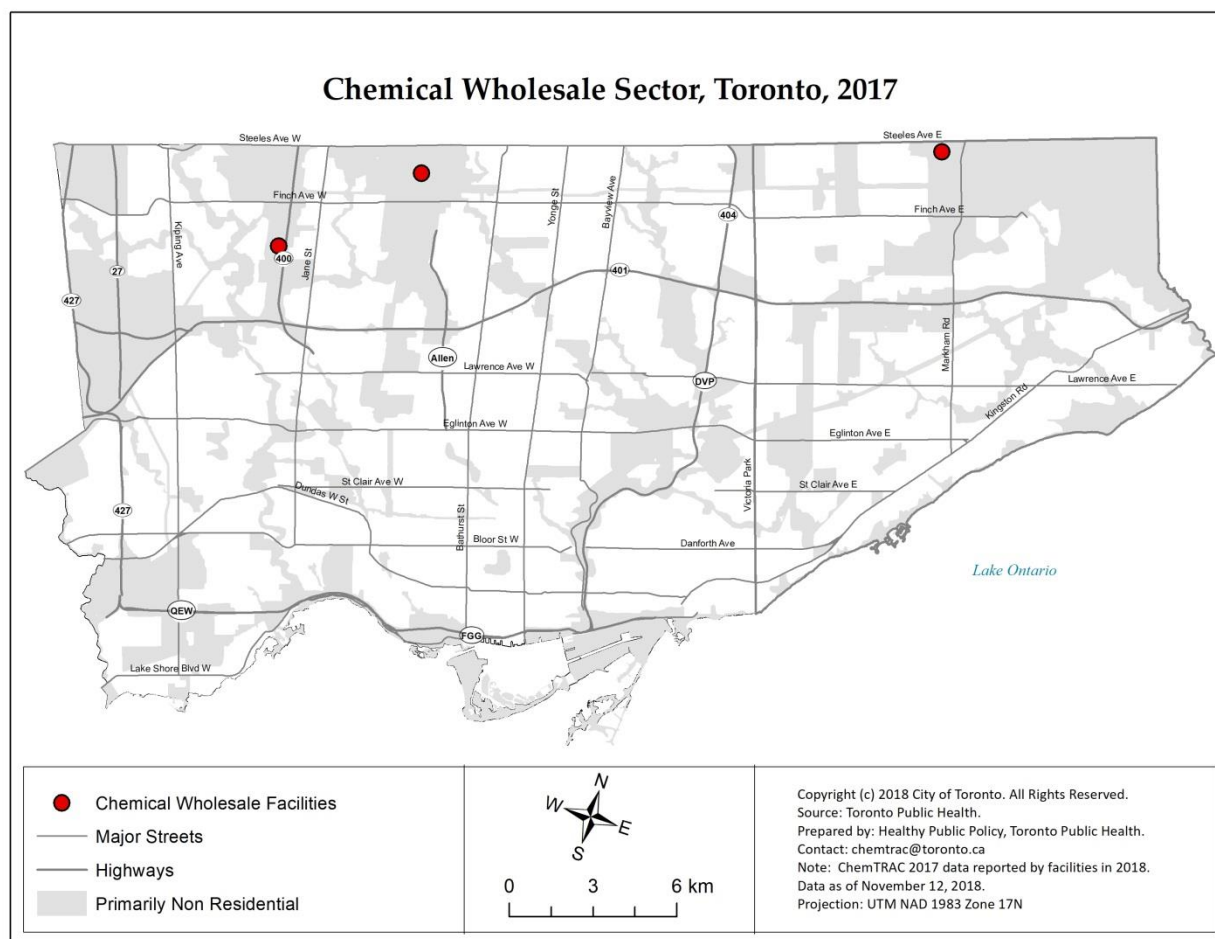


Chemical Wholesale

Types of activities: wholesale of industrial and household chemicals, cleaning compounds and preparations, plastics resins, plastic basic forms and shapes, and industrial gases.

- Number of facilities that were required to report: 3
- Range in number of employees per facility: 14 to 125
- Total amount of chemicals released: 359 tonnes
- Total amount of chemicals manufactured, processed or used: 5,934 tonnes
- Number of priority substances reported: 2

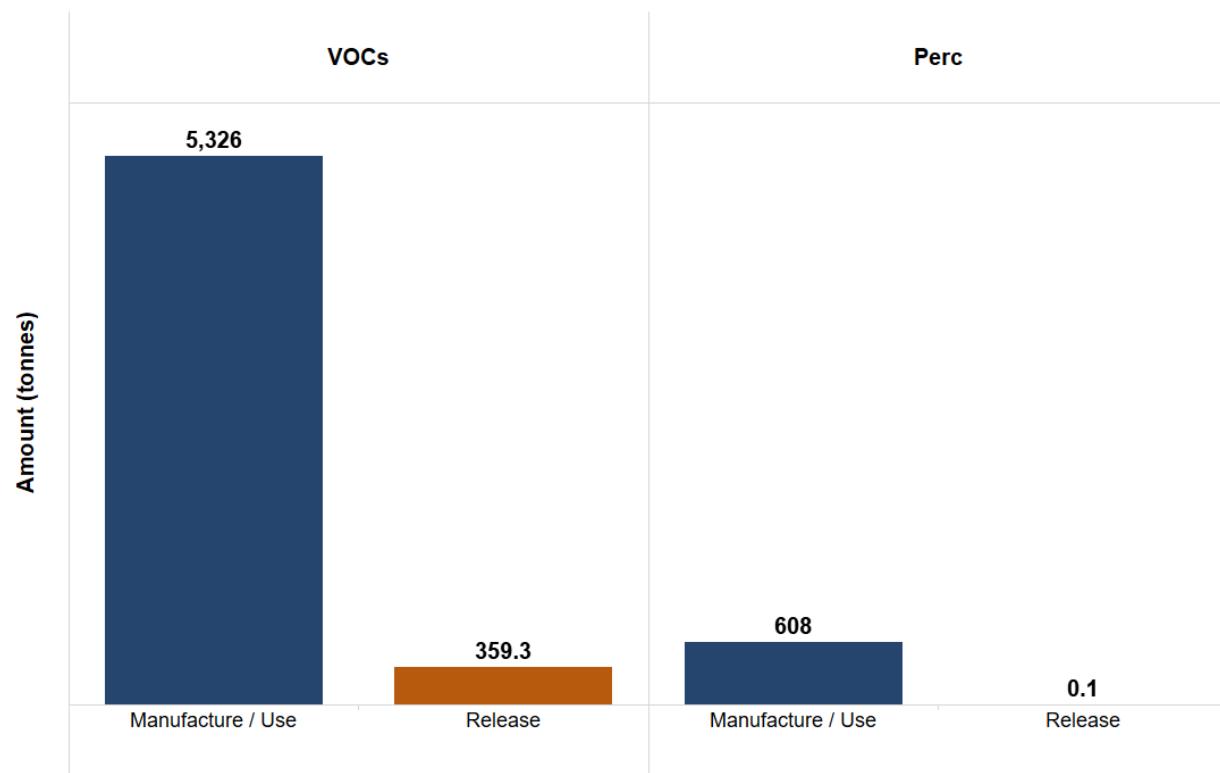
Figure 19: Location of facilities from Chemical Wholesale Sector in 2017



Top substances reported are:

- Volatile organic compounds (VOCs)
- Tetrachloroethylene (Perchloroethylene)

Figure 20: Amount of substances reported for Chemical Wholesale in 2017

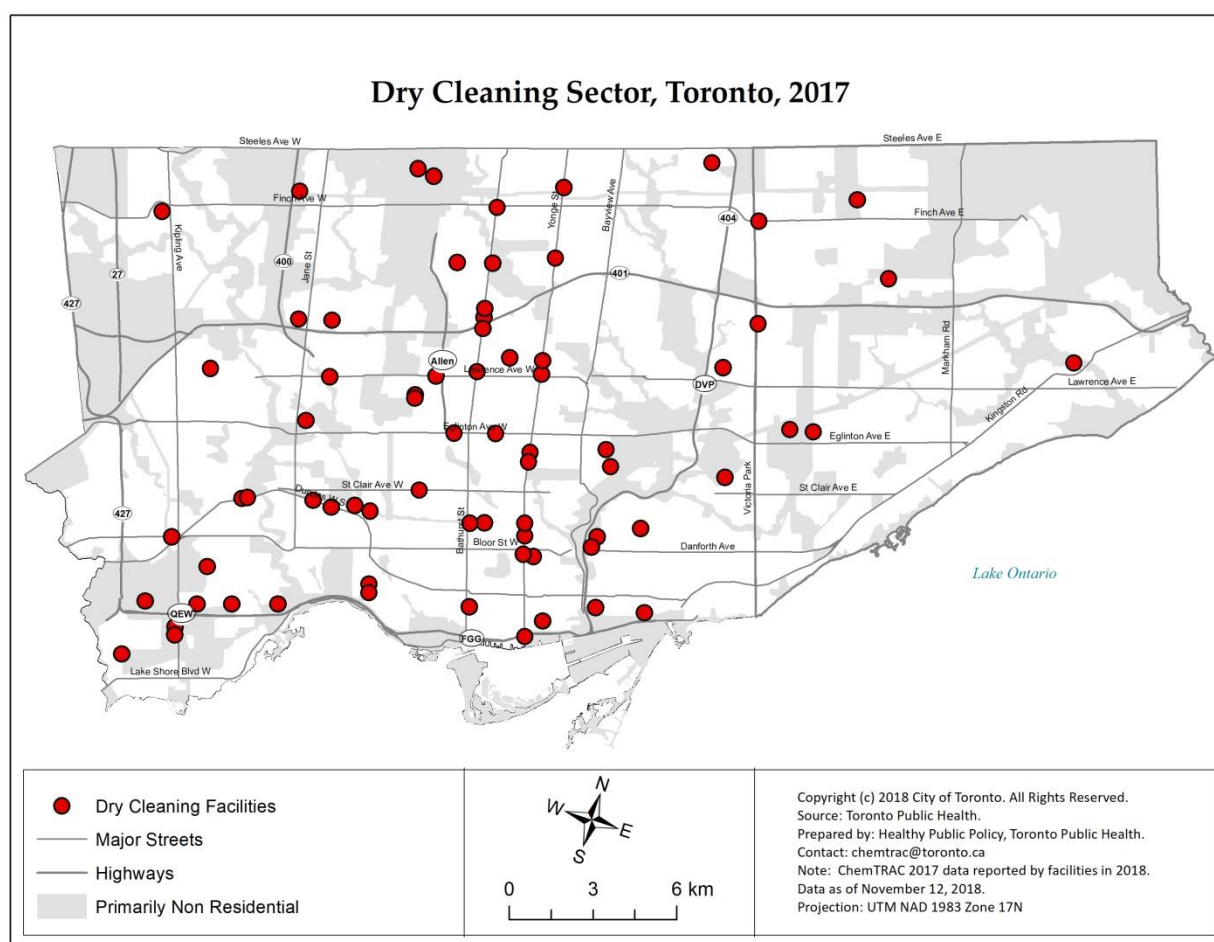


Dry Cleaning and Industrial Laundry

Types of activities: self-service laundry, laundering services, laundering and supplying laundered uniforms, linens and other fabric items and dry cleaning.

- Number of facilities that were required to report: 72
- Range in number of employees per facility: 1 to 169
- Total amount of chemicals released: 41 tonnes
- Total amount of chemicals manufactured, processed or used: 170 tonnes
- Number of priority substances reported: 6

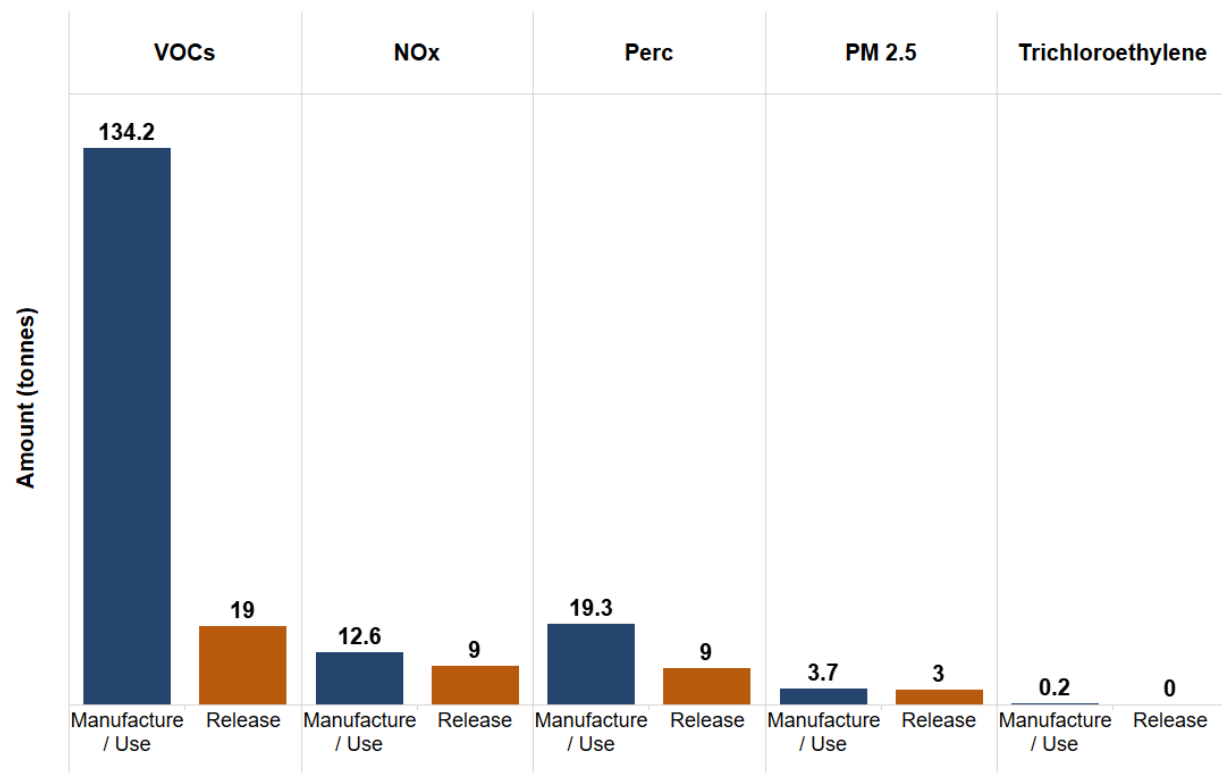
Figure 21: Location of facilities from Dry Cleaning Sector in 2017



Top substances reported are:

- Volatile organic compounds (VOCs)
- Nitrogen oxides (NOx)
- Tetrachloroethylene (Perchloroethylene)
- Particulate matter 2.5 (PM_{2.5})
- Trichloroethylene

Figure 22: Amounts of substances reported by Dry Cleaning and Industrial Laundry facilities for 2017

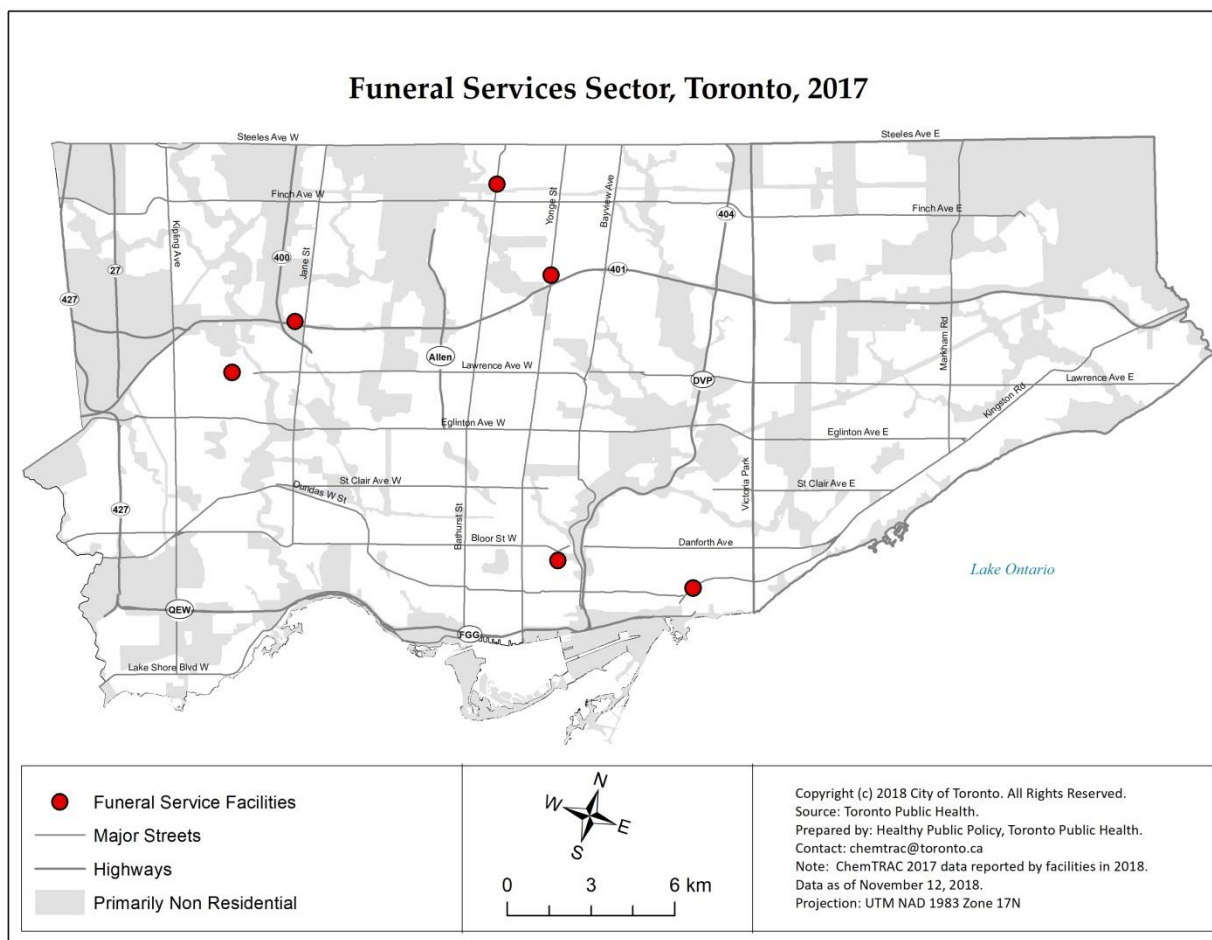


Funeral Services

Types of activities: funeral homes, cemeteries and crematoria.

- Number of facilities that were required to report: 6
- Range in number of employees per facility: 1 to 35
- Total amount of chemicals released: 0.2 tonnes
- Total amount of chemicals manufactured, processed or used: 0.3 tonne
- Number of priority substances reported: 3

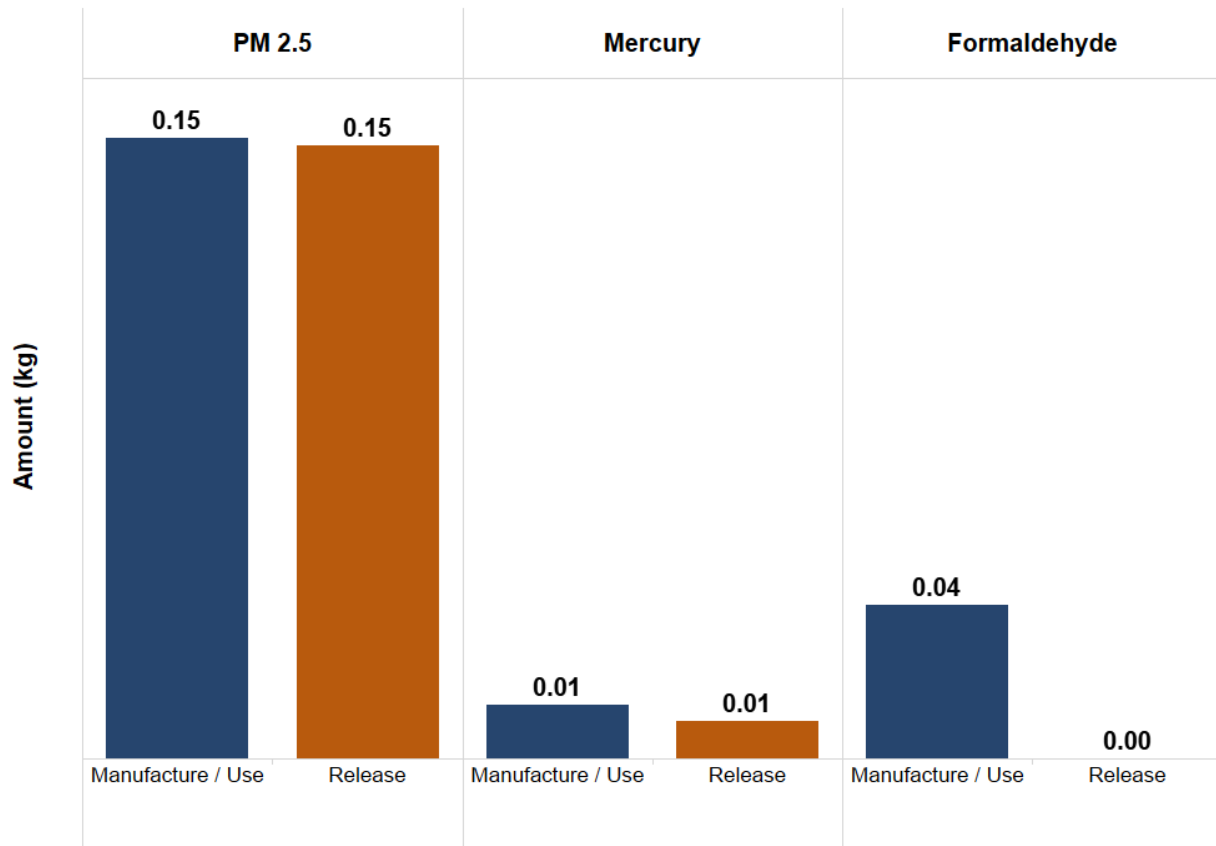
Figure 23: Location of facilities from Funeral Services Sector in 2017



Top substances reported are:

- Particulate matter 2.5 (PM_{2.5})
- Mercury and its compounds
- Formaldehyde

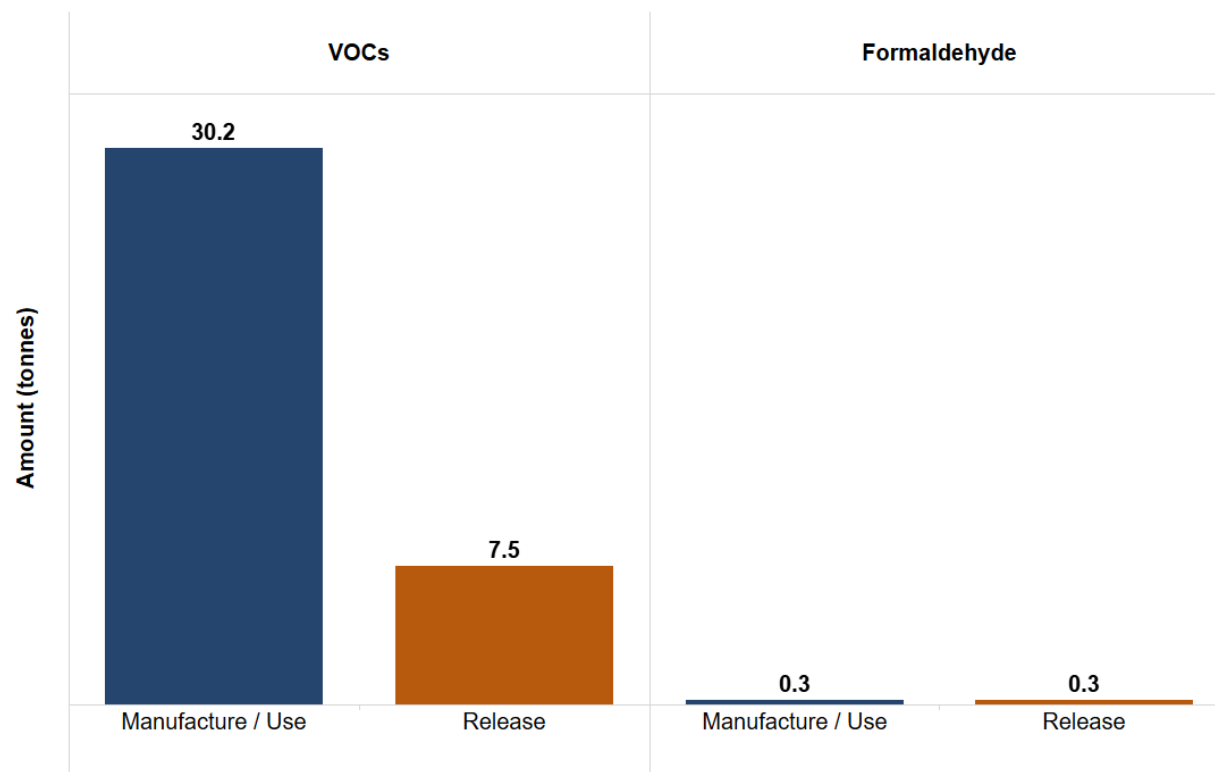
Figure 24: Amount of substances reported for Funeral Services for 2017



Top substances reported are:

- Volatile organic compounds (VOCs)
- Formaldehyde

Figure 26: Amounts of substances reported by Medical and Diagnostic facilities for 2017

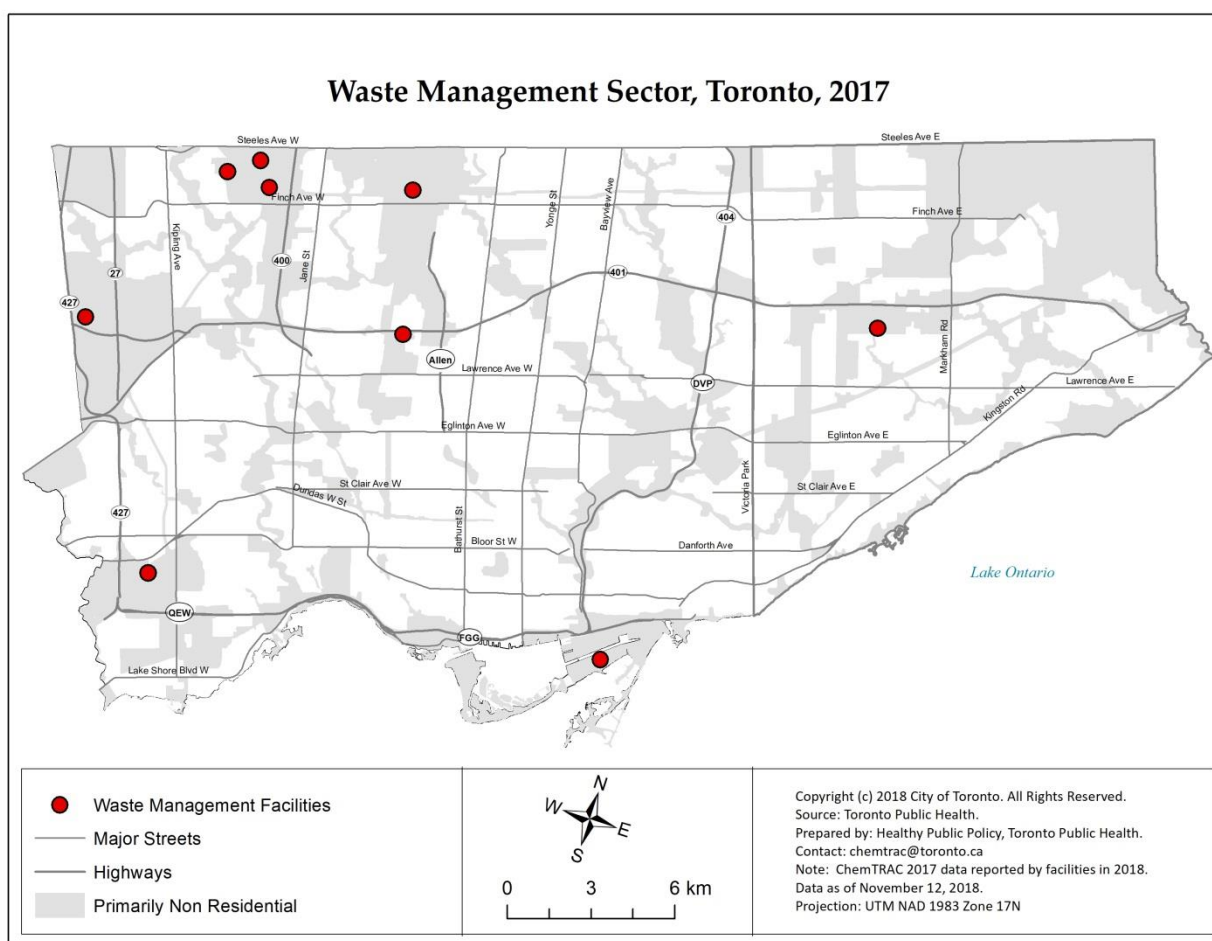


Waste Management and Remediation

Types of activities: waste collection, treatment and disposal services, environmental remediation services, septic tank pumping services and recovery facilities.

- Number of facilities that were required to report: 9
- Range in number of employees per facility: 1 to 191
- Total amount of chemicals released: 14 tonnes
- Total amount of chemicals manufactured, processed or used: 490 tonnes
- Number of priority substances reported: 11

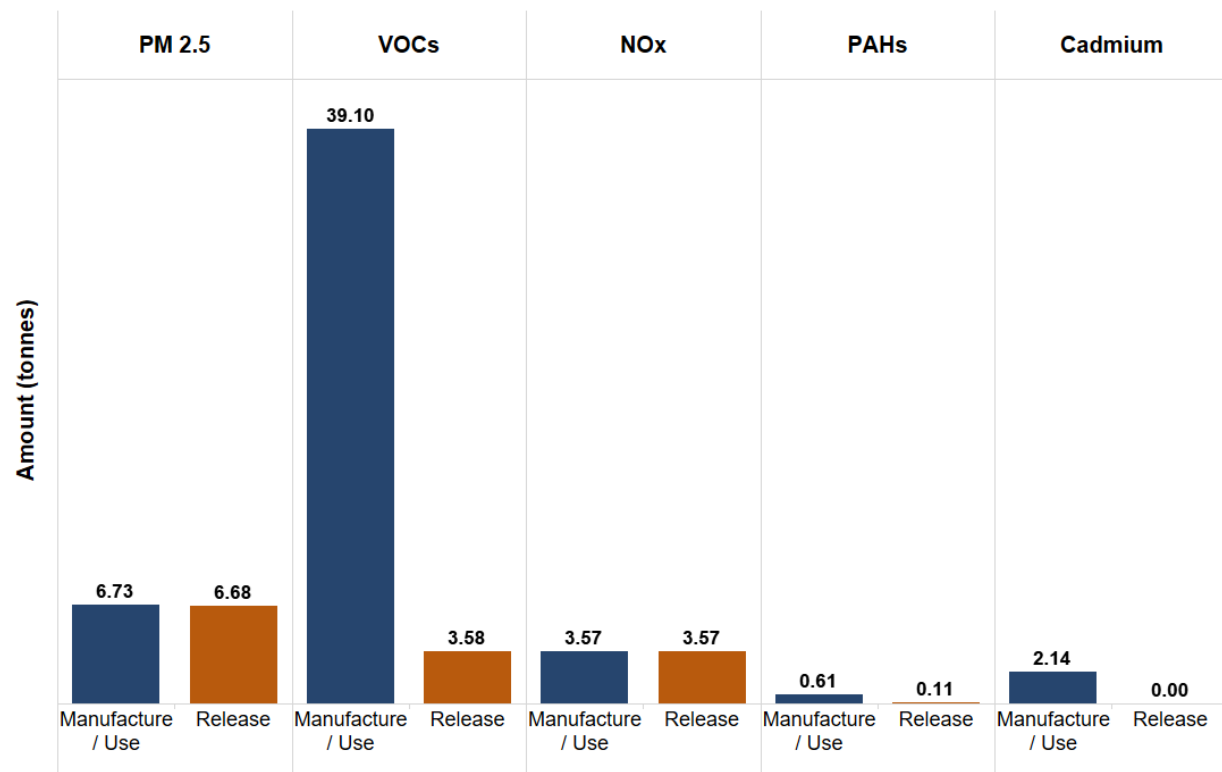
Figure 27: Location of facilities from Waste Management Sector in 2017



Top substances reported are:

- Particulate matter 2.5 (PM_{2.5})
- Volatile organic compounds (VOCs)
- Nitrogen oxides (NO_x)
- Polycyclic Aromatic Hydrocarbons (PAHs)
- Cadmium

Figure 28: Amounts of substances reported by Waste Management facilities for 2017

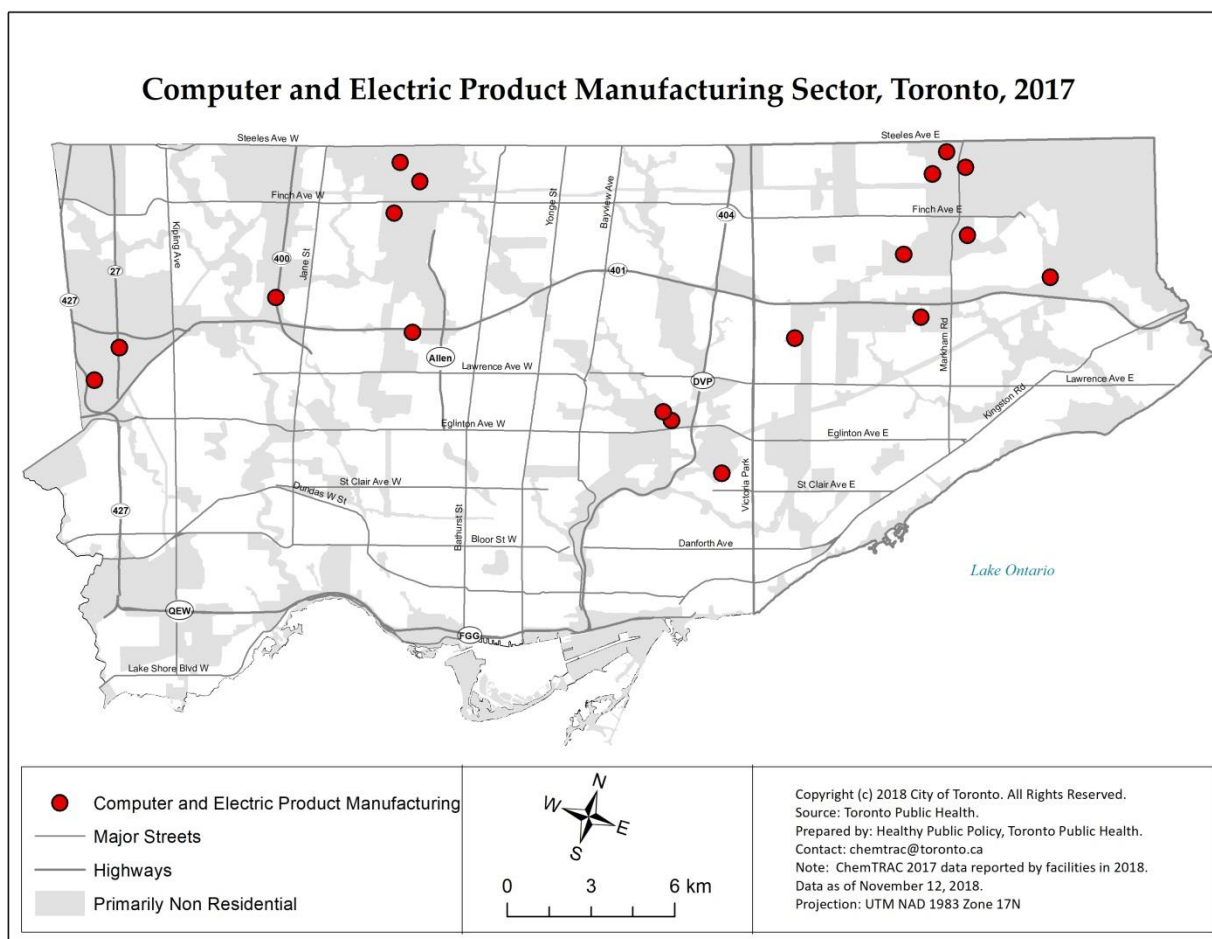


Computer and Electric Product Manufacturing

Types of activities: manufacture of computers, computer peripherals, and communications equipment.

- Number of facilities that were required to report: 18
- Range in number of employees per facility: 1 to 740
- Total amount of chemicals released: 44 tonnes
- Total amount of chemicals manufactured, processed or used: 117 tonnes
- Number of priority substances reported: 9

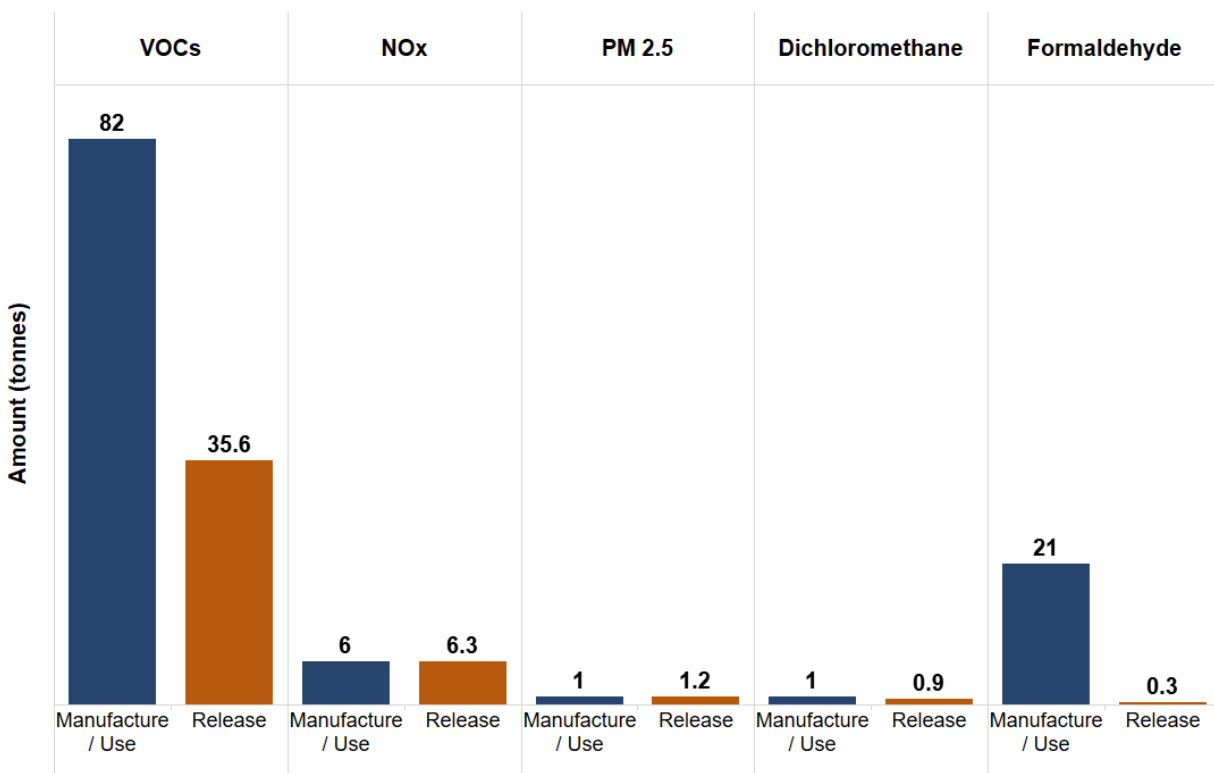
Figure 29: Location of facilities from Computer and Electric Product Manufacturing Sector in 2017



Top substances reported are:

- Volatile organic compounds (VOCs)
- Nitrogen oxides (NOx)
- Particulate matter 2.5 (PM_{2.5})
- Dichloromethane
- Formaldehyde

Figure 30: Amounts of substances reported by Computer and Electric Product Manufacturing facilities for 2017

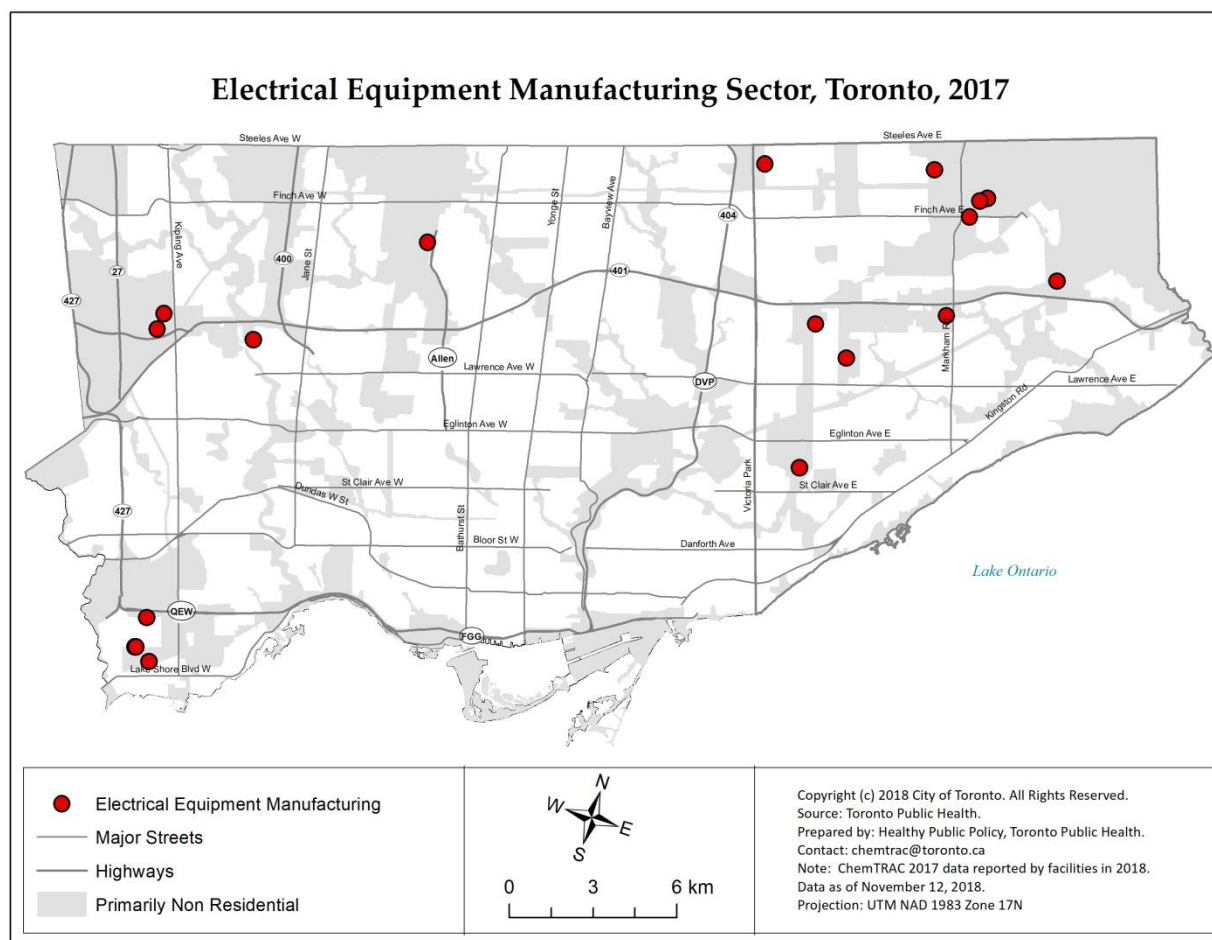


Electrical Equipment, Appliance and Component Manufacturing

Types of activities: manufacture of product that generate, use and distribute electrical power. Common activities include Metal cutting, metal processing, painting and welding.

- Number of facilities that were required to report: 18
- Range in number of employees per facility: 3 to 337
- Total amount of chemicals released: 29 tonnes
- Total amount of chemicals manufactured, processed or used: 101 tonnes
- Number of priority substances reported: 10

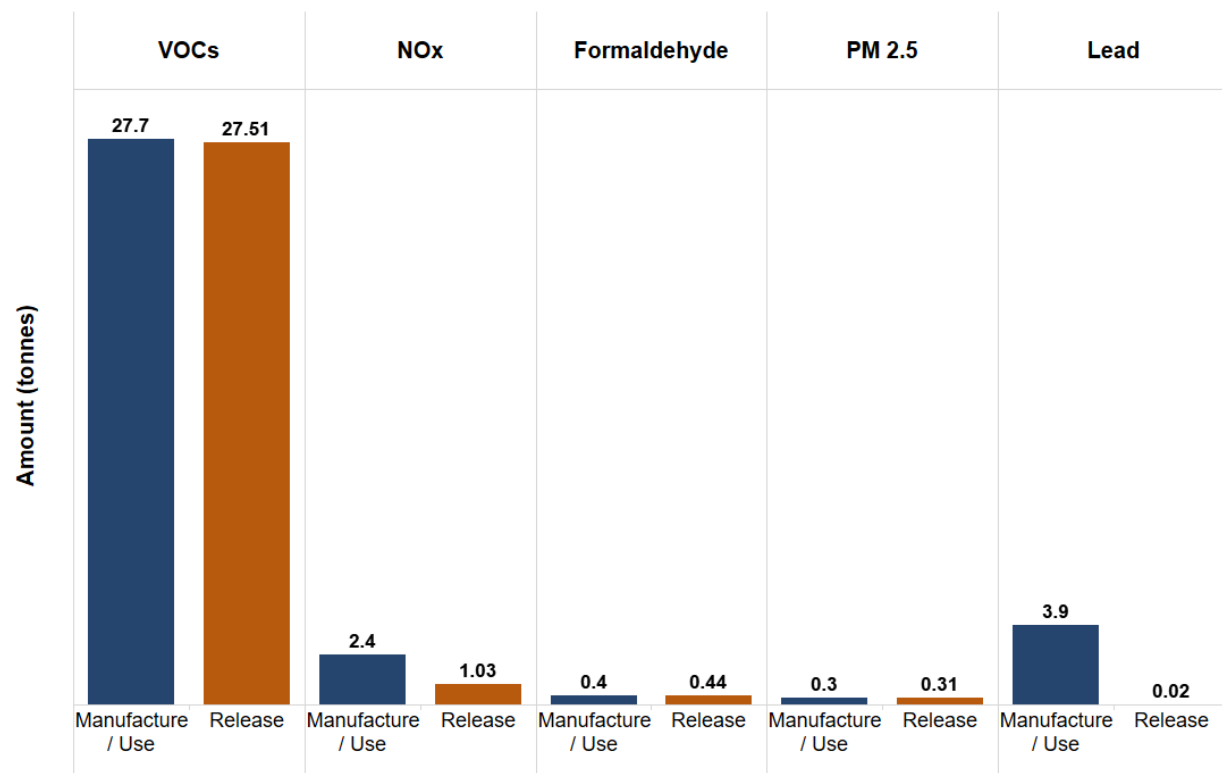
Figure 31: Location of facilities from Electrical Equipment Appliance and Component Manufacturing Sector in 2017



Top substances reported are:

- Volatile organic compounds (VOCs)
- Nitrogen oxides (NOx)
- Formaldehyde
- Particulate matter 2.5 (PM_{2.5})
- Lead

Figure 32: Amounts of substances reported by Electrical Equipment, Appliance and Component Manufacturing facilities for 2017



Fabricated Metal Product Manufacturing

Types of activities: transformation of metal to end-use products by forging, stamping, bending, forming, machining, welding and assembling.

- Number of facilities that were required to report: 74
- Range in number of employees per facility: 1 to 566
- Total amount of chemicals released: 376 tonnes
- Total amount of chemicals manufactured, processed or used: 6,818 tonnes
- Number of priority substances reported: 12

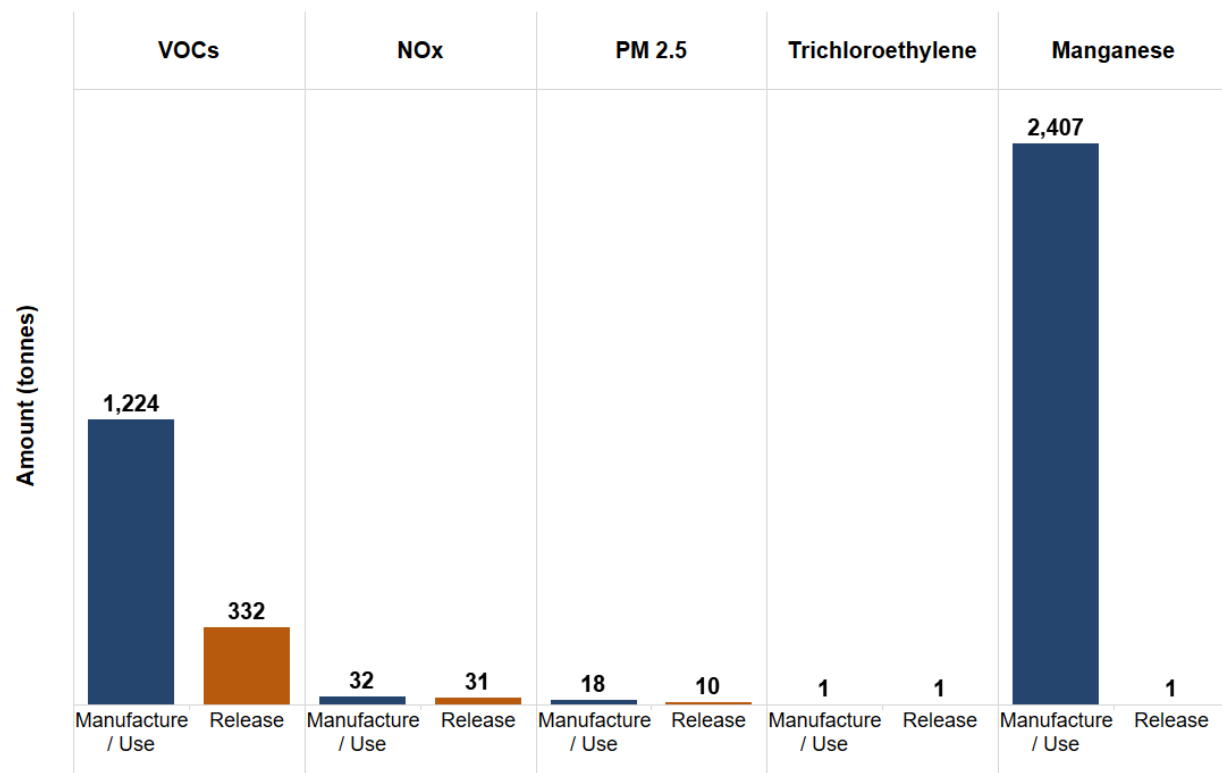
Figure 33: Location of facilities from Fabricated Metal Product Manufacturing Sector in 2017



Top substances reported are:

- Volatile organic compounds (VOCs)
- Nitrogen oxides (NOx)
- Particulate matter 2.5 (PM_{2.5})
- Trichloroethylene
- Manganese

Figure 34: Amounts of substances reported by Fabricated Metal Product Manufacturing facilities for 2017



Non-Metallic Mineral Product Manufacturing

Types of activities: transformers of mined or quarried non-metallic minerals, such as sand, gravel, stone, clay, and refractory materials into products for intermediate or final consumption. Processes used include grinding, mixing, cutting, shaping, and honing.

- Number of facilities that were required to report: 19
- Range in number of employees per facility: 1 to 200
- Total amount of chemicals released: 153 tonnes
- Total amount of chemicals manufactured, processed or used: 758 tonnes
- Number of priority substances reported: 8

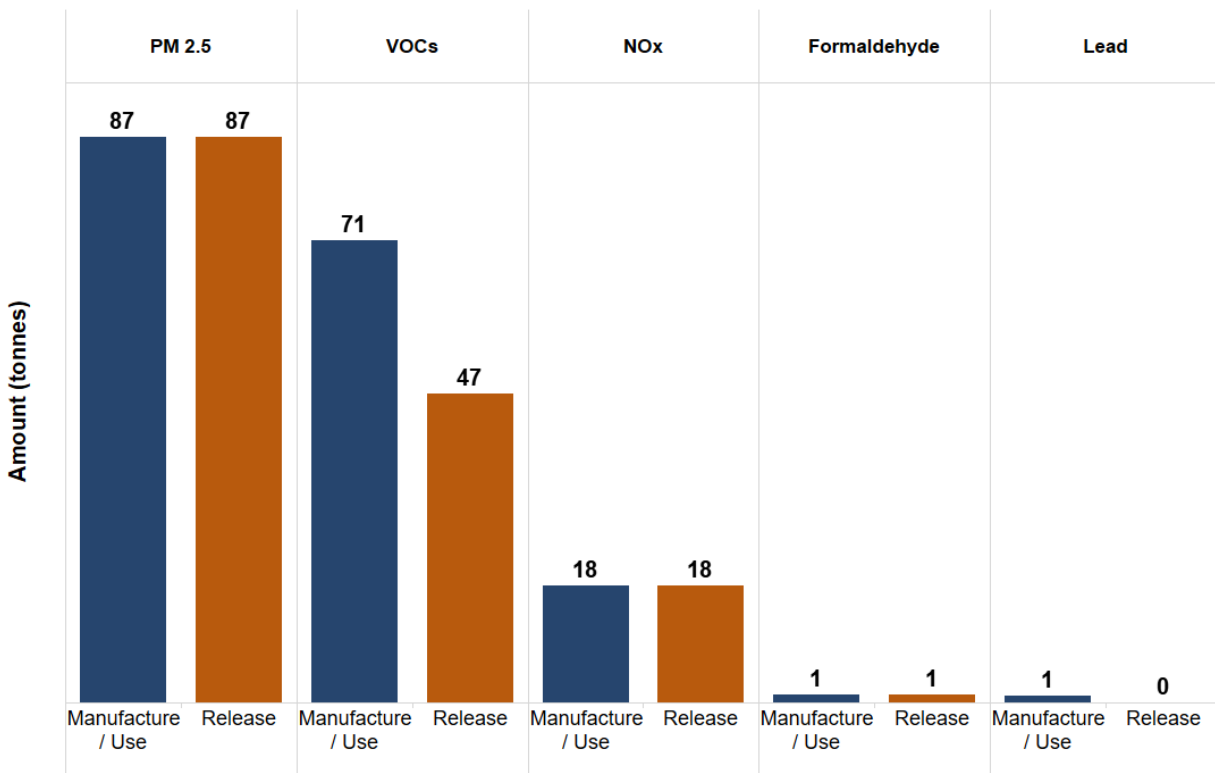
Figure 35: Location of facilities from Non-Metallic Mineral Product Manufacturing Sector in 2017



Top substances reported are:

- Particulate matter 2.5 (PM_{2.5})
- Volatile organic compounds (VOCs)
- Nitrogen oxides (NO_x)
- Formaldehyde
- Lead

Figure 36: Amounts of substances reported by Non-Metallic Mineral Product Manufacturing facilities for 2017



Paper Product Manufacturing

Types of activities: manufacturer pulp, paper and paper products. The manufacture of pulp involves separating the cellulose fibres from other impurities in wood, used paper or other fibre sources. The manufacture of paper involves matting these fibres into a sheet. Converted paper products are produced from paper and other materials by various cutting and shaping techniques.

- Number of facilities that were required to report: 9
- Range in number of employees per facility: 5 to 457
- Total amount of chemicals released: 339 tonnes
- Total amount of chemicals manufactured, processed or used: 339 tonnes
- Number of priority substances reported: 6

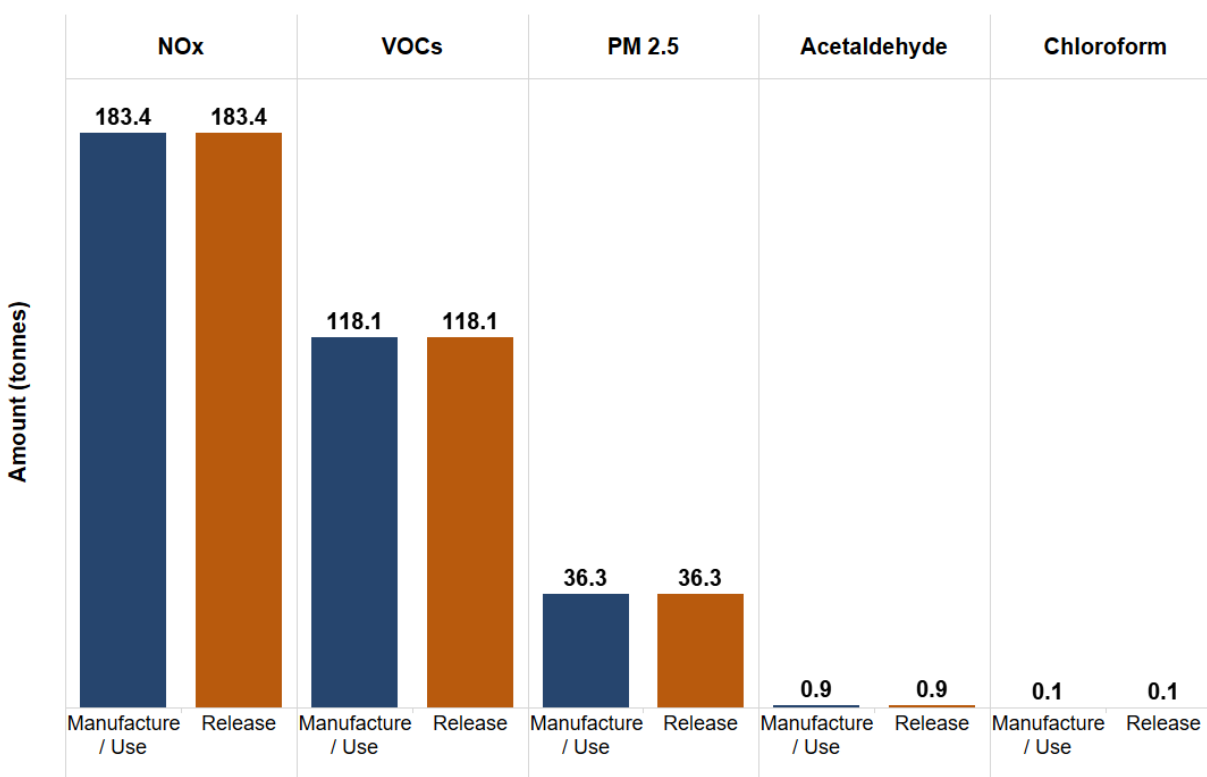
Figure 37: Location of facilities from Paper Product Manufacturing Sector in 2017



Top substances reported are:

- Nitrogen oxides (NO_x)
- Volatile organic compounds (VOCs)
- Particulate matter 2.5 (PM_{2.5})
- Acetaldehyde
- Chloroform

Figure 38: Amounts of substances reported by Paper Product Manufacturing facilities for 2017



Types of activities: primarily engaged in smelting and refining ferrous and non-ferrous metals from ore, pig or scrap in blast or electric furnaces. The output of smelting and refining is used in rolling and drawing operations to produce sheet, strip, bars, rods and wire, and in molten form to produce castings and other basic metal products.

- Number of facilities that were required to report: 15
- Range in number of employees per facility: 5 to 350
- Total amount of chemicals released: 57 tonnes
- Total amount of chemicals manufactured, processed or used: 632 tonnes
- Number of priority substances reported: 10

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Top substances reported are:

- Nitrogen oxides (NO_x)
- Particulate matter 2.5 (PM_{2.5})
- Volatile organic compounds (VOCs)
- Nickel
- Lead

Figure 40: Amounts of substances reported by Primary Metal Manufacturing facilities for 2017

