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List of 25 substances to be monitored by Toronto

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STAR STAFF

Here is the list of 25 substances potentially emitted by companies in Toronto that will be monitored under the city's newly passed "right to know" bylaw.

Acetaldehyde: Found naturally in many foods and herbs, but also widely used in industry. The greatest potential for exposure is to workers in the organic chemicals industry, in fabricated rubber products and biological products industries. Sources include emissions from stationary engines and power plants that burn fossil fuels, wood or trash; oil and gas extraction; refineries; cement kilns; lumber and paper mills. It's also a potential problem for vehicle mechanics, gas station attendants, automobile paint sprayers, even people who work in coffee-roasting and animal rendering operations. Consumer products like adhesives, lubricants, inks and nail polish remover are other potential sources. Acetldehyde irritates the skin, eyes, throat and respiratory tract; may cause nausea, vomiting, headache, dermatitis and fluid in the lungs. Larger exposure can cause hallucinations, loss of intelligence, damage to several internal organs, and even death.

Acrolein: A highly flammable liquid used as a chemical intermediate in making plastics or colloidal forms of metals. It has been used as an additive for perfumes and a herbicide in water. In the past, it was used in tear gas.

Exposure affects the lungs; long-term exposure may affect the respiratory, reproductive, neurological and haematological systems. You can be exposed to acrolein in tobacco smoke or vehicle exhaust, living near industries where it's used or made, or by inhaling vapours from overheated cooking oil.

Benzene: Even brief exposure to very high levels of this toxin can kill. Mild exposure can result in skin and eye irritations, drowsiness, dizziness, headaches and vomiting. It is linked to immune system damage, leukemia and birth defects. Low levels of benzene are found in tobacco smoke and vehicle exhaust. It's used to make a large number of chemicals that contribute to the production of plastics, synthetic fibres, detergents, pharmaceuticals and pesticides. It is used as a solvent for fats, oils, inks, paints, plastics, and rubbers, and as a degreasing agent. Benzene is also used to make some types of rubbers and is found in motor fuels.

It may be released into the air from industries such as footwear manufacturing or oil refining, and may be present in the fumes you breathe in while filling your gas tank.

1,3-Butadiene: An odourless gas; probable carcinogen. Exposure irritates the eyes, nose and throat; high levels can cause central nervous system damage, blurred vision, nausea, fatigue, headache, slow pulse rate and unconsciousness. Long-term exposure can damage heart and lungs. Workers in petroleum refining, manufacture of synthetic materials and oil and gas extraction are most at risk. Other sources of exposure are cigarettes, breathing air in heavy traffic areas and smoke from forest fires.

Cadmium: Naturally occurring metal often combined with other elements, such as cadmium oxide, released when it burns. Toxic if inhaled, it's a byproduct of treating zinc, copper, lead, and iron ores. Smokers and workers producing things like phosphate fertilizers, PVC products, photocells, gasoline, oils, tires, radiators, some dyes and colours, electronic components, heating elements in electric kettles and hot water systems, batteries, and ceramic glazes are most likely to be exposed to cadmium in air. Coal- and oil-burning power plants may emit cadmium; so do tobacco smoke and car fumes. Long-term exposure damages lungs and kidneys. Has been linked to kidney and prostate cancer in humans and lung and testicular cancer in animals.

Chloroform (Trichloromethane): Once used as a surgical anesthetic, chloroform is a probable carcinogen that's gradually being replaced by less toxic substances. It is a solvent used in producing refrigerants, plastics such as vinyl chloride, resins, floor polishing, adhesives, photographic chemicals, dyes, drugs and pesticides. It's used as a fumigant and in fire extinguishers. It's found in spot-removers used by dry cleaners. It may be found in trace amounts in water treated with chlorine, such as pools. Exposure to vapour can irritate eyes, nose and throat. Low concentrations can cause dizziness, fatigue, light-headedness, nausea, confusion and headaches. Longtime exposure damages the liver, kidneys, skin and central nervous system. It may be involved in some fetal abnormalities.

Chromium, Hexavalent: Breathing in these highly toxic chromium compounds can damage and irritate your nose, throat, lungs, stomach and intestines. It may lead to asthma and other allergic reactions; stomach upsets, ulcers, convulsions, kidney and liver damage. Long-term exposure can have adverse effects on the respiratory and the immune systems and cause cancer. Emissions may come from chemical manufacturers, metal finishers (such as chrome plating), industries involving pharmaceuticals, wood, stone, clay and glass products; electrical and aircraft manufacturers, steam and air conditioning supply services, cement plants and incinerators. Chromium also enters the air when vehicle brake linings containing it break down. Consumer products that contain it include some inks and paints, some rubber and composite floor coverings, treated timber products and toner powder used in copy machines.

Chromium, Non-hexavalent: A relatively common natural element, this form of chromium is toxic in high doses, but tiny amounts are actually needed for health. People allergic to chromium may have asthma attacks after breathing high levels in air. Atmospheric contamination is caused by the combustion of natural gas, oil and coal. Emissions may come from similar sources to other chromium compounds.

1,2-Dibromo ethane (Ethylene dibromide): A probable carcinogen, EDB when breathed in can irritate and cause a fluid buildup in the lungs. Long term, it can affect the brain, damage skin, damage sperm in men, damage the liver and kidneys and at very high exposures cause death. It's used in leaded gas, in treating timber and making plastics, as a fumigant in soils, grains, fruits and vegetables, and as a preparation for dyes and waxes. It can show up in contaminated wells.

1,4-Dichlorobenzene: Used mainly as a fumigant for controlling moths (for example in moth balls), tree-boring insects, molds and mildew and as a space deodorant for toilets and garbage containers. It is also used in producing other chemicals. Long-term exposure has ill effects on the liver, skin and central nervous system and has been shown to cause kidney tumours in animals.

1,2-Dichloroethane (Ethylene dichloride): This irritant may cause eye problems, headache, feelings of drunkenness, fatigue, central nervous system depression, convulsions, fluid in the lungs and even death from respiratory and cardiac failure. Long-term exposure may cause damage to the liver, kidneys, lungs and adrenal glands. May be emitted into the air from refineries and manufacturers making plastics, chemicals, paints and varnishes.

Dichloromethane (Methylene chloride): Emissions to the air may come from manufacturers of plastic products, synthetics, urethane foam, electronics and paints. Exposure irritates the lungs and in lower doses may cause headaches, fatigue and drunk-like behaviour. Exposure to high concentrations can cause an irregular heartbeat, unconsciousness and death. Long-term exposure can damage the liver and brain. It's also a suspected carcinogen. Besides industries, it's found in many consumer products: Aerosol paints, automotive and machinery refinish paints and primers, automotive body polish and cleaners, aerosol air fresheners and deodorants, furniture polish and cleaners, hairsprays, household hard surface cleaners (aerosol and liquid), household insecticides, household tints and dyes, lubricating greases and oils, automotive chemicals, paint and varnish removers and thinners, shoe polish and cleaners, pet flea and tick products, and waterproofing compounds.

Ethylene dibromide (dibromoethane): A probable carcinogen that has been linked to increased risk of many different cancers. Ethylene dibromide is no longer used as a fumigant or additive in leaded gas, but it's still used in producing dyes, resins, waxes, and gums.

Formaldehyde: This eye, nose and throat irritant can cause asthma-like allergies and bronchitis. Higher exposure can cause throat spasms and a buildup of lung fluid, leading to death. It's a potential carcinogen present in smog, cigarette smoke and fumes from open fireplaces. Vehicle exhaust is a major source. It's also released from burning fuel in homes and products such as carpets, particleboard, and some insulation, and can be produced in the atmosphere by smog-forming chemical reactions. Formaldehyde-based resins are used in permanent press fabrics, wallpaper, paint, grocery bags and waxed paper, as well as some detergents, cosmetics and other domestic chemicals like shampoo. It is used in medicine-based industries (forensics, hospitals and pathology labs), embalming fluid in funeral homes, film processing, leather tanning and textiles.

Lead: Can affect almost every body organ and system, but especially the nervous system. Can increase blood pressure and cause anemia, malnutrition, abdominal pain and colic; high levels can damage the brain and kidneys, cause miscarriages and affect sperm. In children, affects mental and physical growth. Mining and manufacturing of metals, cement, lime, plaster, concrete, ceramics, motor vehicles and parts, wood products, batteries, ammunition, solder and textiles are some of the sources.

Manganese: This naturally occurring substance is needed for health. But too much can lead to manganese poisoning, which can cause impotence and bronchitis, or over the long term, damage to the central nervous system – hallucinations, emotional instability and disturbances in behaviour, followed by neurological symptoms such as muscle weakness, speech disturbances and Parkinson's-type symptoms. May be emitted into air from the mining, crushing, and smelting of ores, during steel production, and from battery factories.

Mercury: Exposure to high levels can permanently damage the brain, kidneys, and developing fetus. Effects on brain functions may result in irritability, shyness, tremors, changes in vision or hearing and memory problems. High exposures of mercury vapour may cause chest pain, shortness of breath, and a buildup of fluids in the lungs that can be fatal.

Mercury is used in thermometers, batteries, powerful outdoor lights and compact fluorescents, and as a catalyst in chemical manufacturing. Mercuric chloride is used in photography and embalming. Industries emitting it to the air may include fossil-fuel power plants, metal smelters and concrete plants. Small amounts are present in vehicle exhaust.

Nickel: An abundant natural element, nickel can be released into the air by combustion of coal and other fossil fuels, by mining and refining operations, steel production, nickel alloy production, electroplating, and municipal waste incineration. Breathing in cigarette smoke also exposes you to nickel. Nickel dust is irritating to the eyes, nose and throat. Chronic bronchitis, reduced lung function and lung cancer, as well as nasal effects have been observed in workers who breathed high levels of nickel while working in nickel processing. People sensitized to

nickel (for instance, suffering a rash after wearing jewellery containing it), may have asthma attacks following exposure to nickel.

Tetrachloroethylene (Perchloroethylene): This suspected carcinogen is found in a large percentage of dry cleaning fluids. Also used in textile mills and metal cleaning operations. Can be in rubber coatings, solvent soaps, printing inks, adhesives, sealants, polishes, lubricants and silicones.

In high concentrations, in air, with closed or poorly ventilated areas, single exposures may cause central nervous system effects leading to dizziness, headache, sleepiness, confusion, nausea, difficulty in speaking or walking, and possibly unconsciousness and death. It is a narcotic at high levels. Adverse liver and kidney effects have been observed in workers that had long-term exposure. It will also defat the skin causing irritation and dryness.

Trichloroethylene: A central nervous system depressant that has been used as an anaesthetic for surgery. Some people intentionally inhale it for its narcotic properties. Exposure to moderate amounts may cause headaches, loss of balance, and tremors. Very large exposures may cause irreversible cardiac problems, nerve and liver damage, and death. Chronic (long-term) exposures to trichloroethylene have also been shown to cause nausea, intolerance to fatty foods, respiratory irritation, kidney toxicity, and immune system depression. It's probably also carcinogenic.

Primary sources of trichloroethylene emissions are the industries that manufacture it or use it in production, such as makers of chemicals, rubber, pharmaceuticals, semiconductors, heavy equipment, iron and steel, pulp and paper, paints, inks, varnishes and lacquers, and the manufacture of pens, pencils, art and office supplies.

Vinyl chloride: Breathing high concentrations of vinyl chloride monomer fumes for a short time may cause headaches, dizziness, sleepiness, unconsciousness, and at extremely high levels, can lead to death. Breathing VCM fumes over many years can result in impotence, permanent liver damage, immunological dysfunction and nerve damage.

Industries that use it are those who produce PVC – used for hoses, pipes, wire and cable coatings, packaging materials, furniture and automobile upholstery, flooring, windows, credit or ATM cards, wall coverings, housewares, outdoor furniture, plastic containers, wrapping film, automotive parts and many other uses.

Polycylic Aromatic Hydrocarbons (PAHs): Exposure to these compounds can irritate the eyes, nose, throat and bronchial tubes. Skin contact can cause irritation or a skin allergy. Very high levels may cause headaches, nausea, damage the red blood cells, damage the liver and kidneys, and may even cause death. Several are probably carcinogenic.

Primary sources of emissions are petroleum refineries, coal and oil power plants, paper mills, makers of wood and aluminum products and industrial machinery. Asphalt roads and fires of all types may also contribute PAHs to the air, as can oil furnaces, creosote-treated wood and home barbecues.

Nitrogen Oxides (NOx): A mixture of gases, low levels of which can irritate eyes, nose, throat and lungs, possibly leading to coughing, shortness of breath, tiredness and nausea. Exposure can also result in a buildup of fluid in the lungs. Breathing high levels can cause rapid burning, spasms and swelling of tissues in the throat and upper respiratory tract, reduced oxygenation of tissues and possibly death. Smokers and people who live near combustion sources such as coal-burning power plants or areas of high motor vehicle usage, or in households that burn a lot of wood or use kerosene heaters or gas stoves may be exposed to higher levels. Workers employed in facilities that use welding materials, produce nitric acid or certain explosives may inhale oxides of nitrogen during their work.

Particulate Matter 2.5: Fine particles 2.5 micrometers or less in diameter, 1/40th the width of a human hair. Health effects include absorption of toxic materials into the blood, allergic effects, bacterial and fungal infections, respiratory symptoms, aggravated asthma and cancer. Risks are highest for the elderly and children.

Produced from a wide range of industrial processes through bulk material handling, combustion and minerals processing, for example brickworks, refineries, cement works, iron and steel making, quarrying and fossil fuel power plants. Diffuse sources include lawn mowing, wood stoves, fires, and wind generated dust. Vehicles will generate particulates either from direct emissions from burning gasoline or from wear of tires.

Volatile Organic Compounds: A term for a variety of chemicals emitted as gases from certain solids or liquids, ranging from paints and lacquers to paint strippers, cleaning and disinfecting supplies, pesticides, air fresheners, dry-cleaned clothing, building materials and furnishings, office equipment such as copiers and printers, correction fluid, graphics and craft materials including glues and adhesives, permanent markers and photographic solutions. Because of their presence in so many household products, VOC levels can be higher inside homes than outside, even in rural areas. After activities such as paint stripping, the level of VOCs in your home air can be up to 1,000 times higher than the outdoor background level. Health effects can range from eye, nose and throat irritation to headaches, loss of coordination and nausea; and damage to the liver, kidney and central nervous system. Some VOCs are suspected of causing cancer. Likelihood of ill effects depends on the particular gases involved, and the level and length of exposure.

Source: Government of Australia substance fact sheets found at www.npi.gov.au and U.S. Government fact sheets at www.epa.gov