

Soil Pollution

There are numerous causes of soil pollution that occur every day or even every minute. For ease of reference, they are generally split into two: man-made (anthropogenic) causes and naturally occurring causes.

Man-Made Pollutants

Anthropogenic (man-made) soil pollution originates in several types of processes, some deliberate (**industrial**) and some accidental. Human-caused soil pollution can work in conjunction with natural processes to increase the toxic contamination levels in the soil.

- **Accidental spills and leaks** during storage, transport or use of chemicals (e.g. leaks and spills of gasoline and diesel at **gas stations**); **Foundry activities** and manufacturing processes that involve furnaces or other processes resulting in the possible dispersion of contaminants in the environment; **Mining activities** involving the crushing and processing of raw materials, for instance, heavy metals, emitting toxic substances; **Construction activities** (see below) **Agricultural activities** involving the diffusion of herbicides, pesticides and/or insecticides and fertilizers; **Transportation activities**, releasing toxic vehicle emissions **Chemical waste dumping**, whether accidental or deliberate – such as illegal dumping; **The storage of waste in landfills**, as the waste products may leak into groundwater or generate polluted vapors **Cracked paint chips** falling from building walls, especially lead-based paint.

Construction sites are the most important triggers of soil pollution in urban areas, due to their almost ubiquitous nature. Almost any chemical substance handled at construction

sites may pollute the soil. However, the higher risk comes from those chemicals that can travel more easily through the air as fine particulate matter. The chemicals that travel as particulate matter are more resistant to degradation and bioaccumulate in living organisms, such as PAHs. Additionally, construction dust may easily spread around through the air and is especially dangerous because of its lower particle size (less than 10 microns). Such construction dust can trigger respiratory illnesses such as asthma and bronchitis, and even cancer. Moreover, the sites that involve the demolition of older buildings can release asbestos, a toxic mineral that can act as a poison in soil. Asbestos particles can be redistributed by the wind.

Natural Pollutants

Apart from the rare cases when a natural accumulation of chemicals leads to soil pollution, natural processes may also have an influence on the human released toxic chemicals into the soil, overall decreasing or increasing the pollutant toxicity and/or the level of contamination of the soil. This is possible due to the complex soil environment, involving the presence of other chemicals and natural conditions which may interact with the released pollutants.

Natural accumulation of compounds in soil due to imbalances between **atmospheric deposition** and leaking away with precipitation water (e.g., concentration and accumulation of perchlorate in soils in arid environments), **Natural production** in soil under certain environmental conditions (e.g., natural formation of perchlorate in soil in the presence of a chlorine source, metallic object and using the energy generated by a thunderstorm), **Leaks from sewer lines** into subsurface (e.g., adding chlorine which could generate trihalomethanes such as chloroform).

Examples of Soil Contaminants

There is a large variety of pollutants that could poison the soil.

Lead is dangerous even at the smallest levels, especially when these levels are sustained in time. It is extremely toxic for young children even in low doses, and in higher doses it can be fatal for humans in general. For thousands of years, lead was a common component in numerous everyday items, from drinking cups to enamels. In more recent times, it became a massive "ingredient" in industrial production: water pipes, coffins, tableware, bullets, fuel additive, paint, cosmetics, batteries, canning.

Mercury The reason for the removal of mercury from most products commercially available in the U.S. is that numerous studies have confirmed its great toxicity. Because mercury can be present in many forms – metal, vapor or salt – and in many compounds, we may not always be aware that contact has taken place. However, mercury can be inhaled or absorbed through the skin, and mercury poisoning is extremely dangerous. The use of mercury has been severely cut down in the past years, especially in more advanced countries. However, in many places it is still not fully regulated and therefore still present on the market in various products.

Arsenic It's a mainstay of detective fiction; it's a naturally occurring element in the earth's crust, from which it spreads through water, soil and air; it's useful in many ways, but toxic in even more ways. Arsenic is a very versatile element, and it has been known to humans for millennia. The term itself comes from the Arabic word *al zarniqa*, meaning "yellow".

Copper (noted in the table of elements as Cu, from the Latin cuprum, a corrupted form of the name Cyprium, from the island where it was mined by the Romans)) is a soft, highly conductive metal. It is a common metal easily mined and easily available – allowing for millions of years of human use at the current rate. Although copper is essential to humans in very small doses, exposure to excess levels can be extremely harmful. Sources of copper toxicity can be anything from exposed copper in cookware to contaminated drinking water or excessive use of supplement pills. Copper wiring, insecticides and other unprotected products rich in copper can also represent contaminants.

Zinc was and is still used in plating because of its anti-corrosive properties. It is also used in batteries, and its alloys and compounds are also very common in contemporary life.

Zinc can easily contaminate the soil and water in areas where it is naturally present or mined. When ingested in excess, whether voluntarily through supplements or involuntarily through exposure to contaminated soil or water, zinc can cause various health problems. Since the mid-19th century it has been commonly used in coins, and later acquired various other uses, in many cases in various alloys: Coins, Stainless steel, Wiring, Electric guitar strings, Jewelry, Plumbing, Propeller shafts, Tints, Faucets, Cookware, Detergents, Rechargeable batteries, Industrial uses (industrial magnets, gas turbines, etc.), Dental fillings, orthodontics etc., Surgical implants, Foods (imitation whipped cream or butter. While nickel can be naturally found in water and soil, it is often encountered in areas with human pollution. In small quantities, it is eliminated through urine or the intestinal tract; in larger doses, however, it is toxic and may cause serious health conditions.

Herbicides and insecticides are chemical or biological agents used to kill unwanted pests that may diminish crops or otherwise affect human life. They are known for their beneficial effects, as well as for the hazards they may pose to the environment. For humans, herbicides and insecticides are known pollutants. They can be inhaled, ingested through food or water or become harmful through direct skin contact. Depending on the length of exposure and the concentration of the pollutants, they cause serious health concerns, for children particularly, but also for adults.