

# Health and Environmental Effects of Burning Municipal Solid Waste



The burning of municipal waste at a waste disposal site, except for a limited number of specific materials, is prohibited under *The Environmental Management and Protection Act, 2002* (EMPA 2002) and *The Clean Air Act*. The municipality and the operator of a waste disposal site shall ensure that no municipal waste is burned at the site as part of the waste disposal operation. Segregated clean wood and brush may be burned at certain sites only with permission/permit, and are subject to certain requirements. These requirements are provided in *The Municipal Refuse Management Regulations, 1986* (MRMR 1986) and *The Clean Air Regulations*.

## Issues

In some cases community growth has resulted in waste disposal grounds being closer to communities. Burning activities create potential adverse effects to the surrounding environment; employees and users of the waste disposal ground; local area residents; businesses; landowners and children playing outdoors.

Changes in waste composition has occurred with the introduction of products and packaging manufactured from hydrocarbon and chlorinated compounds such as plastic, solvents, or pesticides. Although regulations prohibit hazardous substances and waste dangerous goods from entering the landfill, toxic materials and packaging still make their way to landfills as components of commercial and household waste. Disposal of household cleaning products, pesticides and other materials pose a danger to public health and the environment. Incomplete combustion of waste during open burning contributes to air pollution and climate change.

## Air Pollutants

Worldwide scientific research has conclusively demonstrated that burning of waste at landfills produces air toxins. Typically, burning occurs at low temperatures (250 °C to 700 °C) in oxygen starved conditions. Hydrocarbons, chlorinated materials and pesticide compounds under these conditions produce a wide range toxic gases harmful to the environment and public health. These gases contain dioxins / furans, volatile organic compounds, particulate matter (PM), hydrogen chloride (HCl), carbon monoxide (CO) and oxides of sulfur and nitrogen and liberate metals including antimony, arsenic, barium, beryllium, cadmium, chromium, lead, manganese, mercury, phosphorus and titanium.

Studies have demonstrated that two to forty households burning their trash daily can produce average dioxin / furan levels equivalent to emissions from a modern municipal waste combustor equipped with high efficiency flue gas cleaning technology burning 182,000 kg/day of the same type of waste. The United States Environmental Protection Agency estimates that mixed garbage burning is a larger source of dioxins than coal combustion, ferrous metal smelting, hazardous waste incineration or bleached pulp mill operations.

In addition, the burning of municipal waste produces large amounts of ash and debris and amounts to a 40 - 60% reduction in volume of the original waste. With proper cover and compaction similar volume reductions can be achieved. Typically, compacted waste occupies 40 - 50% of the original volume. The burning of waste produces two types of ash, bottom and fly ash. Fly ash is made of light particles which is carried out by combustion gas and is laden with toxic metals, dioxin / furan and other products of incomplete combustion. Fly ash can travel thousands of kilometers before it drops back to earth where its chemical load might enter the human food chain. In other words burning of waste is not an environmentally sound solution for extending the life of a landfill or the lack of appropriate landfill sites and management practices.

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<b>Pollutant</b>	<b>Health Effects</b>	<b>Environmental Effects</b>
Aldehydes	Causes eye and respiratory illness, headaches. Is an animal carcinogen.	Increased toxic loading on environment; leads to contaminated water/land, affects animals health.
Carbon Monoxides	Causes dizziness, headaches and slowed reflexes. Affect mental function, visual acuity and alertness.	Oxidized to carbon dioxide (which is a green house gas) in the atmosphere.
Chlorofluorocarbons (CFCs)	Causes dizziness, headaches and slowed reflexes.	The primary contributors to stratospheric ozone level depletion and are involved in the global warming effect.
Dioxins and Furans	May cause cancer; causes growth defects; affects DNA; affects immune and reproductive systems. Very toxic.	Increased toxic loading on environment; leads to contaminated water/land, affects animal health. Very toxic and bioaccumulate in the food chain.
Heavy Metals (such as Mercury)	Highly toxic; heavy metals collect in the human system until a lethal dosage is reached. Non-lethal effects can include chronic respiratory or intestinal distress, poisoning of the central nervous system, disruption of effects of the body's hormone system, inhibition of growth and development of children.	Increase toxic loading on environment; leads to contaminated water/land, affects animal health
Hydrochloric Acid	Irritation of respiratory tract, causes respiratory illness; dulls the body's senses.	Increased toxic loading on environment; leads to contaminated water/land, affects animal health.
Hydrogen Sulfide (H <sub>2</sub> S)	Toxic, causes respiratory disease. Healthy people experience shortness of breath, sore throats, breath difficulties, irritated eyes.	Contributes to acid rain; may damage vegetation; causes offensive odors.
Ozone (O <sub>3</sub> )	Exposure to ozone can injure biological tissues and cells. Reduce lung function, including tightness of the chest, coughing pain and breathing difficulty.	Ground-level ozone damages vegetation and ecosystem, affects animal health.
Nitrogen Oxides	Causes respiratory illness, fluid collection in the lungs and fibrotic changes.	Contributes to acid rain and ozone formation.
Particulate Matter (PM)	Irritation of respiratory tract, aggravated asthma, contributes to chronic obstructive pulmonary diseases.	Increased toxic loading on the environment; leads to contaminated Water/land and affects animal health.
Polynuclear Aromatic Hydrocarbon (PAH's)	Cancer causing agent in most animal species including mammals, fish & birds.	Increased toxic loading on environment; leads to contaminated water/land, affects animal health.
Volatile Organic Compounds (VOCs)	Directly toxic including problems ranging from cancer risks to nervous disorders. Causes respiratory irritation/illness, chronic lung disease.	Contributes to low level ozone (smog), causes vegetative damage. Leads to contaminated water/land, affect animals health.
Sulphur Oxides (SO <sub>2</sub> )	Increase in heart/lung disease, acute/chronic respiratory diseases. Health people experience shortness of breath, sore throats, breathing difficulties.	Causes vegetative damage; corrodes many materials; contributes to acid rain (forests, aquatic and urban environments i.e. structures).