

Fluoride in the air environment



The Department of Human Services' Public Health Branch has prepared this fact sheet in collaboration with the Environment Protection Authority (EPA Victoria) to provide balanced, evidence-based information on the likely sources of fluoride in the air environment and its potential environmental impacts.

Key points

- Fluoride is present in plants, animals, most foods, rocks, water sources, seawater and soil. It is also present in air through natural sources as well as industrial or agricultural activities.
- In nature, fluoride is released into the air during heavy bushfires or volcanic eruptions.
- In the home environment, people do not generally breathe in fluoride unless they are a smoker, standing directly over smoke produced by the home coal-fired barbeque or use products that contain fluoride. Low levels can be breathed on a daily basis without any harm.
- In Victoria, industrial activities involving fluoride include the manufacture of bricks, tiles, other ceramic products, fertilisers, and aluminium. Power generation and petrol refining are also sources of fluoride to air in Victoria. Fluoride emissions are controlled to protect the health of workers, the local environment and surrounding residents.
- Vegetation and grazing animals are more sensitive to fluoride than humans. Industry Licence limits set by EPA Victoria require emissions to be well within safe levels for vegetation and grazing animals. Therefore, human health is also protected.

Sources of Airborne fluoride

a) Natural

Fluorides occur naturally in the earth’s crust in rocks, coal, clay and soil. Internationally, the greatest amount of naturally occurring hydrogen fluoride is released into the atmosphere from volcanic eruptions.

Seawater contains fluoride and the ocean releases small amounts of hydrogen fluoride gas and fluoride salts into the air. The heat from bushfires, and wind-blown dusts from the weathering of soil or rocks also release small amounts of fluoride into the air.¹

b) Home environment

Fluoride is produced from coal-fired barbeques and is also contained in cigarette smoke.² Fluoride can also be found in insecticides, fertilisers, floor polishes and some timber preservation finishes.³

c) Industrial

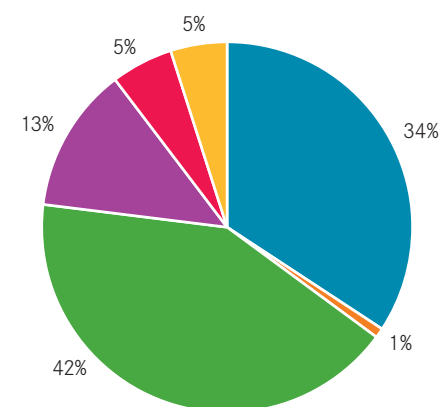
In Victoria, hydrogen fluoride may be released into the air when fluoride-containing substances (eg. coal, minerals or clays) are heated at high temperatures. High temperature processes occur in coal-fired power stations; aluminium smelters; phosphate fertiliser plants; and glass, brick, and tile works.^{3,4} Hydrogen fluoride is the most common fluoride compound found in the air environment near industrial sources. Glass is particularly sensitive to hydrogen fluoride, which can cause etching (or clouding).

Major sources of Fluoride in Victoria

The National Pollutant Inventory (NPI) provides information on the major emitters of fluoride in Victoria. The following graph is based on NPI data for the 2005–06 NPI reporting year.³

The main sources of fluoride emissions are clay brick manufacturing, aluminium smelting and electricity production.

Fluoride emissions to air Victoria 2005/06



- Aluminium Smelting
- Ceramic Tile and Pipe Manufacturing
- Clay Brick Manufacturing
- Electricity Supply
- Fertiliser Manufacturing
- Petroleum Refining

Air Quality Objectives

EPA Victoria administers the *State Environment Protection Policy (Air Quality Management) 2001*, the framework for managing emissions to the air environment. This policy framework contains criteria that are applied in the design phase of an industrial facility to ensure that air emissions do not impact on the environment or human health.

Vegetation and grazing animals are more sensitive to fluoride exposure than humans.^{1,2,5,7,8,9} Limits on industrial fluoride emissions are therefore set to protect vegetation and grazing animals. Meeting these limits also means that human health is protected.⁶

The design criteria for fluoride are:

Design criteria	24 hrs	7 days	90 days
µg/m ³	2.9	1.7	0.50
Parts per billion	3.4	2.0	0.60

Monitoring of fluoride emissions from industrial sources

Fluoride is monitored by a number of industrial facilities in Victoria including Alcoa at both Point Henry and Portland, Pivot at Geelong and Portland, Shell in Corio and at power stations in the Latrobe Valley.

Each facility has an EPA Licence outlining emission limits for fluoride. These limits are set to ensure that the design criteria are met where people may be exposed. Fluoride is measured inside the facility's emission points (or stacks) and reported annually to EPA Victoria.

Licence limits set out in EPA licences require emissions to be well within safe levels. This means that concentrations of fluoride in air around industrial facilities meet the levels that have been set to protect vegetation and grazing animals and therefore human health.

Contact

EPA Victoria on 9695 2722 for information about industrial air emissions of fluoride.

The Department of Human Services, fluoridation information line on 1800 651 723 for information about fluoridating drinking water to prevent dental decay.

References

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5. Australia & New Zealand Environment and Conservation Council, 1990. *National goals for fluoride in ambient air and forage*. Canberra: Australia & New Zealand Environment and Conservation Council.
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9. Californian Office of Environmental Health Hazard Assessment, 2003. *Determination of Noncancer Chronic Reference Exposure Levels—Fluorides including hydrogen fluoride*. Sacramento: Californian Office of Environmental Health Hazard Assessment.