

## Health Hazards Associated with Volcanic Ash

Health Protection Scotland is liaising closely with colleagues across the UK to monitor the movement of the plume of volcanic dust from the recent Icelandic eruption, which is currently within the atmosphere above the United Kingdom.

The probability of significant health effects in Scotland associated with the volcanic dust is thought to be relatively low. Colleagues within the Health Protection Agency advise that even if the plume does drop towards the ground, the concentrations of particles at ground level are unlikely to cause significant effects on health. Rainfall over the UK could cause a small amount of the ash to be deposited over the country but quantities are expected to be too small to cause health effects.

Scotland has monitoring systems in place for measuring particulate matter in air, and the impact on air quality, and this provides a guide as to how much of the dust is encountered at ground level and any risk of exposure by the public.

## Background Information

### Volcanic Ash Composition

Volcanic ash is formed during volcanic eruptions when molten magma is aerosolised and condenses into particulates of rock, other rock fragments and glass. Additionally, solid rock is shattered by explosive expansion of volcanic gases, adding even more rock components to the mixture. The overall composition, therefore, consists of small particles of volcanic rock including pumice and quartz, other rocks, minerals and volcanic glass varying in size - generally less than 2 millimetres in diameter and down to fine particles of under one micron (0.001 millimetres). It is hard, does not dissolve in water, is very abrasive, potentially mildly corrosive and can conduct electricity when wet. The composition will vary depending on the original volcano location. It should be noted that volcanic ash is not a product of combustion; hence it is not a primarily carbon-based dust and does not, therefore, have the same potential health effects as combustion products.

The size of particles in volcanic ash decreases exponentially with distance from the volcanic eruption. At far distances, dust will include fine particulates. These may be deposited down-wind or washed out by precipitation. Salts and toxic gases (HF, HCl, SO<sub>2</sub>) may be converted to acids and absorbed into ash particles. There may be a smell of sulphur associated with the ash dust.

## Health Effects

Volcanic ash dust is not usually considered poisonous but is abrasive, potentially corrosive and may be irritant to humans.

Short term exposure to volcanic ash, even in areas relatively close to the volcanic eruption, has not been associated with significant adverse health effects. Effects in areas very remote from the original eruption are likely to be small and transient, i.e. short-lasting, if at all.

Exposure to volcanic dust may cause short term symptoms due to mucous membrane irritation such as a runny nose, sore throat, dry cough, irritated or itchy eyes and minor skin irritation. These effects will be transient. Those with existing respiratory conditions such as chronic bronchitis, emphysema and asthma may be affected and experience breathing effects, however these should also be transient.

There remain some uncertainty regarding short and long term effects due the relative scarcity of studies and data. Studies of the cytotoxicity of volcanic ash particles have identified cytotoxic potential which varies depending on the particular volcanic eruption. Studies in the USA following eruptions in Washington State and Oregon showed no severe or lasting health effects in people living in affected areas. Studies into the long term health effects of exposure among occupational groups (such as loggers in the USA) have not identified long term health impacts. The risk of consequences such as chronic bronchitis or pneumoconiosis (a condition associated with exposure to rock dusts) "are probably negligible in humans under the conditions of such occupational exposure to volcanic ash" (MMWR 1986/35(16); 265-7). Hence the probability of any significant health effects is likely to be even lower for the general public in more remote exposure areas.

## Sources

Statement on health effects of Icelandic volcanic ash plume, Health Protection Agency :

[http://www.hpa.org.uk/web/HPAweb&HPAwebStandard/HPAweb\\_C/1271256472871](http://www.hpa.org.uk/web/HPAweb&HPAwebStandard/HPAweb_C/1271256472871)

CDC Fact Sheet: key Facts about Volcanic Eruptions; March 9, 2005.

MMWR WEEKLY. Epidemiologic Notes and Reports Cytotoxicity of Volcanic Ash: Assessing the Risk for Pneumoconiosis  
APRIL 25, 1986/35(16); 265-7

VOLCANIC ASH: EFFECTS AND Mitigation Strategies:

<http://volcanoes.usgs.gov/ash/properties.html>

<http://volcanoes.usgs.gov/ash/volcanoes.usgs.gov/ash/partners.html>

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Potential Health Effects of Volcanic Ash: Health Canada: 2006-12-14:  
<http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/environ/volcan-eng.php>

The health hazards of volcanic ash - A guide for the public. International Volcanic Health Hazard Network (IVHHN), Cities and Volcanoes Commission, GNS science and the United States Geological Survey (USGS).  
[www.ivhnh.org](http://www.ivhnh.org)