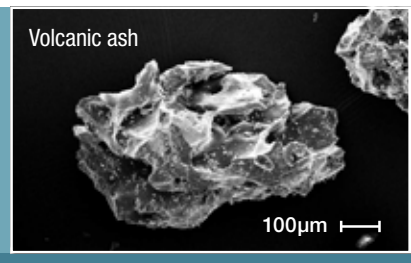
ADVICE FOR WATER SUPPLY MANAGERS

VOLCANIC ASH IS: HARD, HIGHLY ABRASIVE, MILDLY CORROSIVE AND CONDUCTIVE WHEN WET.

ASH IMPACTS ON DRINKING WATER TREATMENT

A VOLCANIC ASHFALL CAN:

- Increase turbidity in raw water sources
- Create high water demand during the cleanup phase.
- Cause operational problems for water treatment plants



EFFECTS ON RAW WATER SOURCES

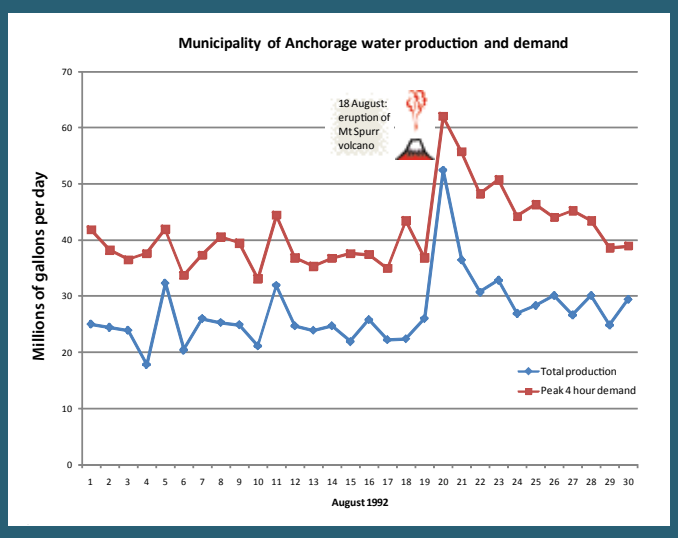
IN GENERAL, THE MAJOR EFFECT OF ASHFALL ON RAW WATER SOURCES IS LIKELY TO BE INCREASED TURBIDITY RATHER THAN CHANGES IN CHEMICAL COMPOSITION.

EFFECTS OF ASHFALL ON RAW WATER QUALITY

Turbidity	Ash suspended in water will increase turbidity in raw water sources. Very fine ash may settle slowly and residual turbidity may remain in standing water bodies. In streams, ash may continue to be remobilised by rainfall events, and lahars may be a hazard in some regions.
Acidity	Fresh ashfall commonly has a strongly acidic surface coating. This may cause a slight depression of pH (not usually beyond pH 6.5) in low-alkalinity surface waters.
Potentially toxic elements	Fresh ash has a surface coating of soluble salts that are rapidly released on contact with water. The most abundant soluble elements are typically Ca, Na, S and Cl, followed by Mg, K, Al, Si, Fe and F. Compositional changes depend on the ash surface chemistry, the amount of ashfall and the dilution volume. • In streams, there will be a short-lived pulse of dissolved constituents. • In lakes and reservoirs, the volume of dilution is usually large enough that compositional changes are not discernible. The constituents most likely to be elevated above background levels are Fe, Mn and Al. Thus water is likely to become unpalatable due to discolouration or a metallic taste before it becomes a health hazard.

WATER DEMAND

HIGH DEMAND FOR WATER TYPICALLY OCCURS AFTER AN ASHFALL DURING THE CLEANUP PHASE.
Demand may remain high for months afterwards if water is needed to dampen down wind-remobilised ash.



The 18 August 1992 eruption of Mt Spurr volcano, Alaska, deposited around 3 mm of sand-sized volcanic ash on the city of Anchorage. The population used mostly wet methods to clean up the ash, creating a peak water demand which resulted in water shortages and loss of pressure in some parts of the city due to bottlenecks in the distribution system. This incident prompted a major upgrade of the city's distribution network

EFFECTS ON TREATMENT PLANTS

VOLCANIC ASH CAN CAUSE A RANGE OF OPERATIONAL PROBLEMS FOR WATER TREATMENT PLANTS.

- Turbidity may be satisfactorily removed by normal coag/floc treatment
- If turbidity exceeds normal operating range of plant for flood flows, suspended ash may penetrate further into plant and block filtration equipment.
- Ash is highly abrasive and likely to cause accelerated wear on pump impellers
- Ash can penetrate bearings and seals and overload motors

An ashfall is unlikely to cause service interruptions for water treatment plants, but a great deal of increased maintenance can be expected. Ash-induced electricity outages are the most common cause of disruptions to water production after an eruption.

Ash can enter sand filter beds both from direct fallout, and through the intake. Cleaning of filter beds creates heavy additional labour demands, such as at Bariloche WTP following the June 2011 Puyehue Cordon- Caulle eruption (below)

RECOMMENDED ACTIONS

WHERE TO FIND WARNING INFORMATION

See www.geonet.org.nz for ashfall forecasts in the event of an explosive eruption.

HOW TO PREPARE

PLANNING

At-risk water treatment plant should ensure that their PHRMPs include provision for ashfall events, including site cleanup. The plan should have procedures for incorporating up-to-date information from GeoNet into operational decisions.

Anticipate increased water demand following an ashfall. Where possible, use alternative, non-potable sources of water for cleanup and firefighting. Do not use recycled wastewater (e.g. treated effluent) for these purposes. Encourage cleanup using brooms and shovels rather than hoses.

Anticipate increased maintenance schedule: review stocks of essential items.

Ensure access to back-up power generation.

HOW TO RESPOND

Take precautions to exclude ash:

- Close intake before turbidity levels become excessive
- If necessary adjust coagulation/flocculation dosage to remove excess turbidity
- Consider covering open filter beds and clarifiers
- Protect other exposed equipment such as electrical control panels
- Maintain a clean site to reduce contamination.

Ensure regular monitoring of turbidity, pH, chlorine residuals and indicator bacteria in distribution network.

Be aware of the possibility of pH depression in low-alkalinity water sources and adjust any pH-sensitive treatment steps as required. For treatment processes that do not include pH adjustment, remind consumers of the need to flush their taps briefly before drawing water.

Public anxiety about contamination of water supplies is common after a volcanic eruption. Refer concerns to the Drinking-Water Assessor at the Public Health Unit of your local DHB.

THE FOLLOWING RESOURCES PROVIDE FURTHER INFORMATION ON VOLCANIC HAZARDS:

http://www.geonet.org.nz
http://www.gns.cri.nz
http://volcanoes.usgs.gov/ash/index.html
http://www.ivhhn.org

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