



# VOLCANIC ASHFALL

## ADVICE FOR WASTEWATER MANAGERS

### Impacts On Wastewater Collection And Treatment Systems

#### VOLCANIC ASH CAN CAUSE SERIOUS DAMAGE TO WASTEWATER COLLECTION AND TREATMENT SYSTEMS

- Cities with combined wastewater and stormwater sewers are particularly vulnerable.
- Ash can also enter sewer networks via inflow and infiltration (e.g. through illegal connections, cross-connections, gully-traps, manhole covers, cracks in sewer pipework).

SYSTEM COMPONENT	IMPACTS OF VOLCANIC ASHFALL
Wastewater network	<ul style="list-style-type: none"><li>• Ash may enter wastewater networks if there are combined sewers, or through inflow and infiltration.</li><li>• Once in wastewater networks, ash may form unpumpable masses which may cause wastewater overflows.</li><li>• Ash-laden wastewater will cause accelerated damage to pump impellers (pitting and thinning of metal).</li></ul>
Pre-treatment	<ul style="list-style-type: none"><li>• Mechanically-cleaned screens are highly vulnerable to damage as ash can abrade moving parts and block screens which may lead to motor and gearbox damage.</li><li>• Fine screens are more vulnerable than coarse screens.</li><li>• Ash may damage comminutors.</li></ul>
Primary treatment	<ul style="list-style-type: none"><li>• Ash may damage grit classifiers.</li><li>• Ash will increase the volume of sludge for disposal, and will increase the inorganic content of sludge.</li></ul>
Secondary treatment	<ul style="list-style-type: none"><li>• Ash can enter open-air biological reactor tanks both through airfall and via influent.</li><li>• The main effect is likely to be reduced capacity (due to ash accumulation on tank floors) rather than interference with bacterial processes. pH control may help prevent 'toxic shock' to bacterial populations.</li><li>• Ash may damage biofilms in trickling filters.</li></ul>
Tertiary treatment	<ul style="list-style-type: none"><li>• Any residual very fine ash may increase suspended solid load of effluent, which may interfere with disinfection.</li></ul>
Sludge treatment	<ul style="list-style-type: none"><li>• Expect an increased volume of sludge with an increased inorganic content.</li></ul>
General impacts	<ul style="list-style-type: none"><li>• Airborne ash may clog aeration pump filters, requiring them to be changed more frequently.</li><li>• Ashfalls may affect road networks, which may affect staff access and deliveries of supplies.</li><li>• Ashfalls can cause electrical power outages.</li><li>• Expect increased maintenance.</li></ul>

### Recommended Actions

#### WHERE TO FIND WARNING INFORMATION

See [www.geonet.org.nz](http://www.geonet.org.nz) for ashfall forecasts in the event of a volcanic eruption.

#### HOW TO PREPARE

At-risk wastewater treatment plants should develop operational plans for ashfall events, including site clean-up. Plans should include provision for:

- Incorporating up-to-date information from GeoNet into operational decisions.
- Monitoring the presence of ash in raw wastewater.
- Monitoring torque on motor-driven equipment.
- Shutting down non-essential equipment.
- Covering exposed equipment such as HVAC systems, switchboards, and electric motors to protect them from airborne ash.
- Limiting the ingress of ash into buildings.
- Equipment and labour requirements for increased maintenance and site cleanup.
- Ensure that staff working outdoors are supplied with adequate personal protective equipment (long-sleeved clothing, heavy footwear, fitted goggles and properly-fitted P2 or N95 dust masks).
- Coordination with local and regional emergency plans.

Review stocks of essential items as an ashfall may affect road and air transport.

Ensure access to back-up power generation, particularly for pumping stations.

#### HOW TO RESPOND

Work with local authorities to limit ingress of ash into stormwater drains and sewer lines.

Step up preventive maintenance.

Consider bypassing pumping stations and treatment plants as a protective measure to avoid severe and costly damage.



Ash-laden wastewater will cause accelerated damage to pump impellers (metal pitting and thinning).

#### FURTHER RESOURCES:

<http://www.geonet.org.nz> (volcano monitoring information)

<http://www.gns.cri.nz/volcano> (general information on volcanic hazards)

[http://volcanoes.usgs.gov/volcanic\\_ash](http://volcanoes.usgs.gov/volcanic_ash) (volcanic ash impacts and mitigation encyclopedia)

<http://www.ivhnn.org> (information on volcanic health hazards)

CONTENT BY CAROL STEWART AND TOM WILSON

DESIGNED BY DARREN D'CRUZ

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### Case Study: City Of Yakima, Washington State, USA

#### VOLCANIC ASH CAN CAUSE SERIOUS DAMAGE TO WASTEWATER TREATMENT PLANTS.

The City of Yakima, Washington State, USA, sustained US\$4 million (1980 value) damage to its plant following the 1980 eruption of Mt St Helens volcano which deposited approximately 10 mm of sand-sized ash on the city. This was primarily due to damage to the mechanically-cleaned bar screen and grit classifier.



Biological reactors at the municipal wastewater treatment plant at San Martin de los Andes, Argentina, continued to function without problems despite receiving 2 cm of ashfall from the 2015 eruption of Calbuco volcano, 165 km away in Chile. This was partially because the town's storm drains and sewers are well separated, so very little ash entered the plant in raw wastewater. Photo credit: Daniel Blake

