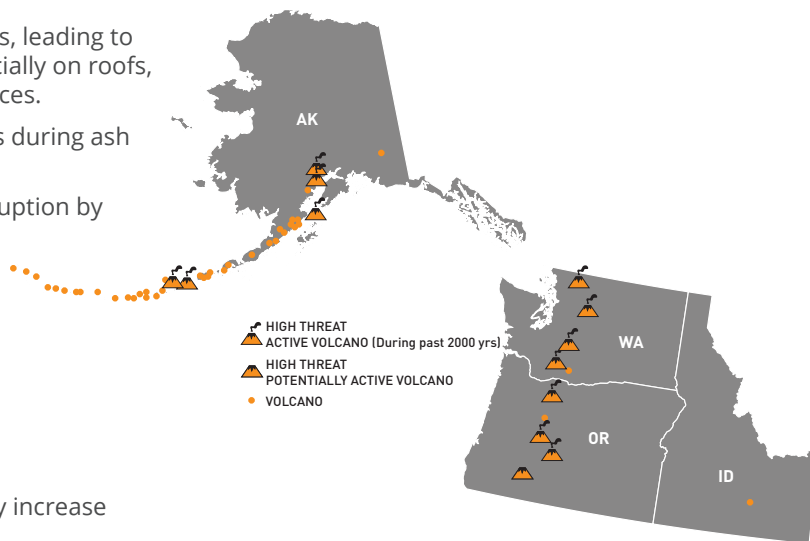


# Advice for FACILITIES MANAGERS

## Impacts on buildings and structures

- > Disruption of heating, ventilation and air conditioning units due to obstructed filters, condensers and air intakes.
- > Contamination of building interiors, leading to:
  - Risk of adverse health impacts for building occupants (see ivhhn.org)
  - Damage to sensitive equipment
  - Abrasion damage to flooring
- > Ash may block gutters and downpipes, leading to localized flooding and damage, especially on roofs, drainage networks, and in ceiling spaces.
- > Abrasive damage to roofing materials during ash removal.
- > Loss of essential services, due to disruption by ashfall
- > Structural damage due to excessive ash loading. Very thick ash deposits (>100 mm) may cause roof collapse, although this ash thickness is rare.
  - Long span, low-pitched roofs are typically the most vulnerable
  - When ash is wet, static loads may increase by up to 100%
  - Non-structural elements, such as gutters, are more vulnerable to failure.
  - Gutters will accumulate ash from the roof, reducing the drainage capacity and further increasing loads.



See companion poster for advice on operating Generator Sets and Heating, Ventilation and Air-Conditioning (HVAC) systems and Advice for Facilities Managers: GenSets and HVAC.

## WHERE TO FIND WARNING INFORMATION (ASH CLOUD FORECAST)

The Volcano Ash Advisory Centre (VAAC) or the USGS Volcano Observatories will issue volcanic advisories and graphics forecasts on ash in the atmosphere affecting aviation.

Current Volcanic Ash Advisories – Washington VAAC <http://www.ssd.noaa.gov/VAAC/messages.html>

Current Volcanic Ash Advisories – Alaska VAAC <http://vaac.arh.noaa.gov>

Current Alerts for U.S. Volcanoes - USGS <https://volcanoes.usgs.gov/vhp/updates.html>

## ADDITIONAL INFORMATION

- > [https://volcanoes.usgs.gov/volcanic\\_ash/aviation.html](https://volcanoes.usgs.gov/volcanic_ash/aviation.html)
- > <http://www.ivhhn.org>
- > U.S. National Volcanic Ash Operations Plan for Aviation, 2007, <http://www.ofcm.gov/p35-nvaopa/fcm-p35.htm>
- > International Civil Aviation Organization, 2015, Manual on volcanic ash, radioactive material and toxic chemical clouds. Document 9691-AN/954, 2015, third edition.
- > <http://www.caa.govt.nz/>

# Advice for FACILITIES MANAGERS

## HOW TO RESPOND

Avoid cleanup until ash has stopped falling. However, in some situations, immediate action may be required to prevent building damage or loss of function.

Use extreme caution, as falls from roofs/structures are a major cause of casualties during ashfalls

### During ashfall

- > Seal building to limit ash ingress:
  - Select an entry point which can be used as an ‘ash lock’. Two sets of doors separated by a few meters are ideal
  - Ash-covered clothing and footwear should be left in this area
  - Use ash foot baths
  - Put damp towels at bottom of external doors
  - Close and seal (e.g. with duct tape) other doors, windows, vents and other gaps
- > Monitor HVAC systems (see companion poster). Minimise use if operation is necessary
- > Limit movement of staff and contractors to reduce their exposure

### After ashfall

#### Exterior Clean up

- > Prioritize areas to be cleaned. Use a ‘top down’ and ‘up-wind’ method to prevent recontamination of cleaned areas
- > Use dry methods where possible. Use shovels to remove bulk of ash, then brooms. Ash may be dampened slightly to reduce dust
- > Start with a small test area, as sweeping some ash types may cause damage to roof surfaces.

- > Clean gutters after adjoining roof surfaces have been cleaned, with a gutter scoop or small trowel
- > Store removed ash in bags to reduce remobilization

#### Interior Clean up

- > Use a vacuum to clean ash where possible
- > Difficult surfaces can be cleaned with a damp cloth
- > Avoid excessive rubbing as this can scratch delicate surfaces
- > Computers and Electronics
- > Cover sensitive equipment with plastic sheeting
- > Equipment can be cleaned carefully using low-pressure compressed air and a damp cloth
- > See companion poster: “Advice for Facility Managers: Computers and Electronics”



## HOW TO PREPARE

At-risk facilities should develop operational plans for managing ash fall events, including:

- > Identify entry/exit points required for building operation, areas which need sealing and restricted access to limit spreading ash
- > Ensuring adequate supplies of necessary equipment
- > Ensure that roofs and similar elevated areas where ash accumulation will need to be removed, have pre-installed fall arrest anchor points and that a safe means of access is identified
- > Cover outlets / downpipes to reduce ash ingress into drainage networks, and if possible disconnect down pipes and/or gutters
- > Shutdown and cover exposed non-essential equipment, where possible
- > Consider dependency on critical services and take steps to increase resilience:
  - Ensure backup power generation
  - Cover water tanks
- > Ash cleanup operations create significant additional labor and resource demands.