

ADVICE FOR FACILITIES MANAGERS: GENSETS AND HVAC

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

AIRBORNE ASH CONCENTRATIONS CAN BE AS HIGH AS 9 g m^{-3} , SEVERAL TIMES GREATER THAN SAND AND DUST STORMS

IMPACTS ON GENERATOR SETS AND HVAC SYSTEMS

A volcanic ashfall can cause electricity outages (see companion poster on transmission/distribution). Therefore use of emergency power generation equipment on electrical transmission (Generator Sets or GenSets) may be necessary. Air intakes on GenSets are vulnerable to airborne ash and need to be protected. Air intakes on heating, ventilation and air-conditioning (HVAC) systems are similarly vulnerable.

COMMON IMPACTS:

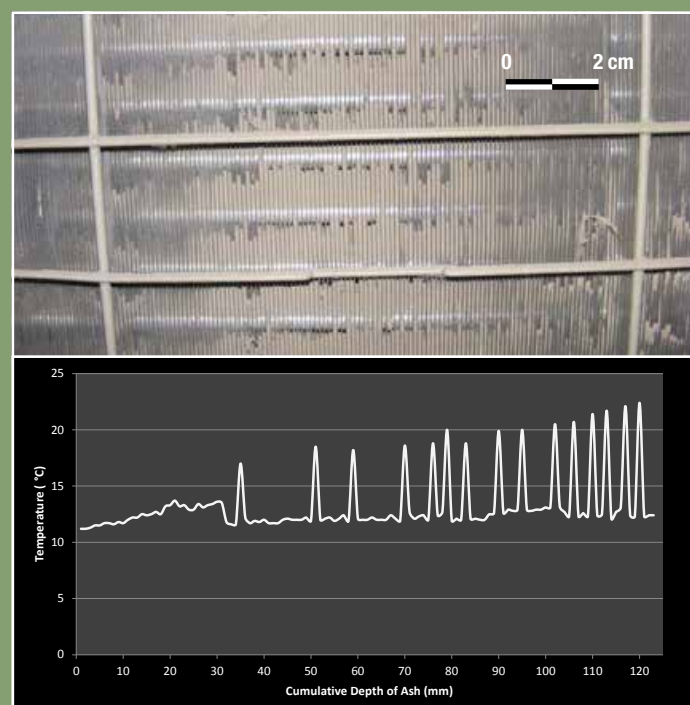
- **Ash Ingress through air intake and condenser units:** ash ingress may cause ash accumulation in the radiator and air filters, reducing air flow and HVAC condenser system performance. Reduced airflows may cause stalling and overheating:
 - » High humidity significantly increases ash adhesion and thus blockage
 - » Filters are generally not designed to cope with the suspended particle volumes seen in volcanic ash falls
 - » HVAC systems with low fan speeds block more readily
 - » Horizontal air-intakes and condensers ingest significantly less ash than vertical systems
- **Ash may cause accelerated corrosion and wear,** usually over timescales of weeks to months:
 - » Exposed, sensitive components outside the GenSet or HVAC casing, such as fuel valves or electrical switches, can be vulnerable to wear, contamination and corrosion
 - » Ingestion of ash into the engine is rarer, but can wear moving parts and block fuel filters, lines and valves

See companion posters on “Advice for Electrical Transmission and Distribution Managers” and “Advice for Power Station Managers” for additional information on effects of ash on power supply systems.



Adaptations to protect GenSet equipment in Bariloche, Argentina, from repeated airborne ash exposure following 2011-2012 eruption of Cordon Caulle volcano, Chile.

Top: sealed fuel valve. Bottom: hood to protect air intake.



Top: Ash accumulation on a HVAC condenser after 11 hours of simulated high-humidity ashfall (1.5 mm/hr ; max. 2 g m^{-3}). Ash with a mean grain size of $\sim 100 \mu\text{m}$ was deposited in the fins (1.5 mm separation). Bottom: Increasing accumulation of moist ash on air conditioner condenser fins leads to increased frequency of shutdowns as compressor overheats.

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

At-risk facilities should develop operational plans for managing ash fall events, including a priority schedule and standardised procedures for inspecting/maintaining/cleaning:

Physical mitigation options:

- Install hoods over air intake to reduce direct ash ingestion (see bottom left figure)
- Add temporary filtration to external air intakes, monitor and replace as needed
- Seal or cover sensitive equipment, such as external fuel valves and switches

Cleaning Guidance:

- Vacuum or gently (30 psi or less) blow away excess ash from air intakes or condensers, then wipe down with a cloth. Air filters should be removed before cleaning
- Wet methods for ash cleanup are not recommended, as they may promote clogging of radiator fins, or cause short-circuits

HOW TO RESPOND

- Initiate priority schedule for inspection, cleaning and preventative maintenance
- Regularly check and service air and fuel intakes and filters (stock spares)
 - » Frequency of air filter replacement could be as high as every 30 minutes during high rates of ash fall. In this case, step up preventative maintenance
- Maintain a clean site, especially in front of air intakes, to reduce remobilisation of ash
 - » Use dry methods where possible. See companion “Advice for Urban Clean-Up Operations” poster
 - » Store collected ash in bags to prevent remobilisation
 - » Ensure stockpiled ash is well clear of equipment and air intakes
- Beware wet ash maybe conductive. Isolate and earth energised apparatus as appropriate
- Advise customers/users not to clean electrical equipment and to limit the use of water in clean up, and to be careful when cleaning near electrical equipment.

MORE INFORMATION

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.ivhnh.org>

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