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*'Understanding volcanoes and society: the key for risk mitigation'*



## Mitigating Volcanic Ash Ingestion to Diesel Generators

G.T. Williams, T.M. Wilson, F. Newberry, Daniel Hill <sup>1</sup>, P. Wilson, M. Gonzalez

<sup>1</sup>Department of Geological Sciences/University, Private Bag 4800, Christchurch 8140

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It is well established that power supply systems are vulnerable to disruption from volcanic ash fall. This can lead to cascading disruption to essential services such as hospitals, water supply and telecommunications which require electrical power to operate. During power outages, emergency power is typically provided by large diesel generator sets (gensets) but there is little understanding of how gensets are likely to perform when exposed to ash fall. Following the 2011 Cordon-Caulle eruption, gensets which supplied power to the town of Bariloche, 92 km southwest of the vent, experienced on-going uncontrolled shutdowns due to ash obstruction of air intakes from light ash falls (~1-2 mm at a time) and wind remobilised ash. Ash ingestion was eventually reduced with the installation of temporary filters and deflection hoods over the air intakes. In this study we use experiments and fluid flow modelling to 1) quantify how much ash is ingested without filtration at different ash doses and 2) find the most effective method for reducing ash ingestion. Experiments are used to test the efficiency of different filter materials under various ash dose scenarios whilst the modelling is used to explore air flow velocities and likely ash deflection associated with different hood designs. In addition to identifying the most effective ash filtration set up this research also aims to aid risk management by identifying how often filters require replacement, at what ash fall concentration generators should be pre-emptively shutdown and at what concentrations additional filtration isn't necessary. The ash fall rates, grainsizes and compositions we test have been chosen to simulate expected ash fall scenarios from volcanoes which could impact the Auckland metropolitan area in New Zealand. However the findings will be widely applicable allowing genset facilities in any volcanically active area to reduce ash impacts with these best-practice mitigation strategies.