

A new tool for assessing the hazards from leachable elements in volcanic ash

Carol Stewart¹, Claire Horwell², Shane Cronin³, Anke Zernack³, Marco Brenna³, Thomas Wilson⁴, Heather Bickerton⁴

¹Joint Centre for Disaster Research, GNS Science/Massey University, Wellington, New Zealand, ²Institute of Hazard, Risk and Resilience, Durham University, United Kingdom, ³Volcanic Risk Solutions, Massey University, Palmerston North, New Zealand, ⁴Department of Geological Sciences, University of Canterbury, Christchurch, New Zealand

E-mail: stewart.carol@xtra.co.nz

Volcanic eruptions can produce a wide range of hazards. Although volcanic phenomena such as pyroclastic density currents and surges, sector collapses, lahars and ballistic blocks are the most destructive and dangerous, volcanic ash is the most widely distributed eruption product and the most likely to be encountered by the public. Following an eruption, the public, civil authorities and agricultural producers will have major concerns about the effects of ashfall on human and animal health, drinking water supplies, crops, soils and surface runoff. Freshly-erupted ash contains a range of potentially toxic soluble elements, which may be released either rapidly or more slowly upon contact with water or body fluids.

As part of the immediate emergency response, there should be rapid dissemination of information about the physical and chemical properties of the ash and its hazardous potential. However, there is a wide range of chemical components that can be tested for, which can lead to confusion about whether a health threat exists or not. To address this uncertainty, an international working group has recently developed a protocol for the analysis of volcanic ash samples to assess the hazard from leachable elements. The purpose of this protocol is to recommend clear, standard and reliable methods for the rapid assessment of hazards from leachable elements. The four applications developed to date are: a general purpose water leach, relevant to assessing impacts on drinking water supplies, livestock drinking water and availability of soluble elements for plant uptake; assessing ingestion hazards to livestock; assessing ingestion hazards to humans; and assessing respiratory inhalation hazards to humans. The adoption of standardised methods should improve and facilitate the comparability of results among different studies and enable the ongoing development of a global database of leachate information relevant for informing improved volcanic health hazards assessment.

This presentation will outline the new protocol and describe its application to recent eruptions (4 June 2011 eruption of Puyehue-Cordon Caulle volcanic complex, Chile; and 6 August 2012 eruption of Mt Tongariro, New Zealand).