



VOLCANO ALERT

(2000 Update)

MAF Policy has a responsibility to prepare for, and respond to, natural disasters affecting agriculture, horticulture and forestry. One of the risks faced by these industries are volcanic eruptions. This leaflet explains the background to eruptions, and simple precautions to take.

New Zealand has been shaped by the collision of two parts of the earth's crust. The friction caused by one tectonic plate riding over the other produces great heat, sometimes vented through volcanoes. About 10 volcanic centres in New Zealand have the potential for activity. These are all in the top half of the North Island. Mount Taranaki, Auckland and Northland have localised areas at risk. The largest concentration of volcanic activity is from Mounts Ruapehu and Tongariro through the Taupo and Rotorua district to White Island off the coast from Whakatane. Volcanic activity, although relatively rare, is a major natural hazard that can inflict widespread damage to life and property. Volcanic hazards fall into three broad areas:

- Pyroclastic deposits: stones and rocks that usually land within 2 km; and ash that can be deposited up to hundreds of kilometres from its source.
- Ground hugging flows of lava (molten rock) and lahar (mudflow produced by erupted material mixing with snow or water).

- Volcanic gases, which present risks close to the crater. Volcanic gases may result in damaging acid rain.

A catastrophic eruption will obviously have widespread effects, however most eruptions will be of a less severe nature. This leaflet refers to those relatively minor events, particularly as they may affect people, animals and land-based industries.

Even a relatively modest eruption can potentially lead to:

- contamination of water supplies;
- contamination of pastures, resulting in lower palatability and, if heavy enough, reduced availability of feed and lower animal performance;
- increased maintenance costs and wear of machinery as the volcanic dust is very abrasive;
- corrosion of vehicles and machinery;
- reduced crop yields and quality;
- reduced quality of wool;
- increased teeth wear of stock and possibly teeth and bone development problems if ash falls are heavy;
- disruption to power supplies; and
- disruption to transportation and communication systems.

What comes out of the mountain?

Aerial emissions from a volcanic eruption are called tephra. Material can be of all sizes, from coarse blocks to fine volcanic ash. The effects of tephra are varied because particles can be distributed widely. Close to source there is likely to be total burial. Beyond that zone, the impact of tephra is largely one of risk to human and animal health, contamination of food supplies and disruption to commerce and public services.

“This leaflet aims to explain the background to eruptions, and simple precautions to take.”

The effects on people

The safety of people is the first priority.

Inhalation of ash can cause discomfort, especially to people with breathing problems such as asthmatics, and can irritate the eyes and throat.

Water quality may be of concern: although for example, taking ash from the 1995 Ruapehu eruption and mixing 1 kg of ash with 1,000 litres of water (about the size of an average trough) would not result in fluoride levels in the water exceeding health standards. The water, however, would be acidic (pH 4.6) and distasteful.

- ☑ Maintaining clean drinking water supplies is crucial. **Disconnecting spouting from roofs to tanks** is a high priority to prevent contamination.
- ☑ **Conservation of water** is important, especially if you rely on rain water. If you are using spring, or artesian water this will not be as significant. Where there is limited storage capacity and you rely on electrical pump reticulation, power cuts for extended periods could be a problem.
- ☑ **Stock up on the usual emergency supplies.** A reserve of batteries, candles, gas/fuel, and food reserves should be maintained to support your family in case of any natural disaster.

Effects on Livestock

The main issues will be the availability of clean water, and contamination of pasture. The 1995 and 1996 Ruapehu eruptions showed that even 1-2 mm of ash deposits put stock off eating pasture. However, American experience has shown that the majority of stock can survive ash falls of 50-300mm.

In general terms, close grazing animals such as sheep and deer would not cope with ash contaminated pasture and feed stuffs as well as cattle. Cows fed on a “supplement” of up to 1.5 kg of Mt St Helens ash per day showed no effects on production, provided they had access to adequate feed.

Possible strategies

Means of coping with ash falls will vary but in most instances supplementary feeding of livestock is likely to be necessary.

- Provision of clean water is important. It will be impossible to protect dams and streams from contamination. Where possible troughs should be emptied regularly and refilled with clean water. Ash taken in through water pumps can be very abrasive, so regular maintenance will be necessary. Heavier ash falls could also disrupt electricity supplies to pumps.
- If ash falls are light, and the weather fine, chasing mobs of stock around will help in knocking the ash off pasture.
- If ash falls are heavier, it may be easier to confine stock to a few small paddocks and feed supplements such as hay, silage and grain.
- Fluoride is a contaminant of ash. It is not regarded as a major problem in New Zealand. However, some stock did die of fluorine poisoning following the 1995 and 1996 Ruapehu eruptions. At average recorded contamination levels of 30-100 ppm, stock would have to ingest a reasonable amount of ash over several days to be affected. If a problem is suspected, feed out supplements and seek veterinary advice.
- In a major eruption it may be necessary for all members of the farming family, and farm staff, to be evacuated. In this situation, the most humane and practical option for livestock may be to open up all gates within the farm, but *not* onto roadways. Keep hay sheds and silage pits covered/protected as much as possible as it

will be required after the eruption. If you are evacuated, remember to take your pets and working dogs with you.

Livestock evacuation

The logistics involved in mounting a rescue operation for animals are daunting, and make it unlikely that a major rescue is feasible.

Obviously, the number of animals moved to safety would depend on the time available, the number of truck and trailer units involved, and the number of round trips able to be made per day. Feed sources at the destination could also be restrictive as well as the facilities for handling (especially dairy stock). It will be essential for farmers and rural organisations in a region to formulate plans which outline what their options will be if a major event occurs.

Effects on horticulture

There is little that can be done to protect horticultural crops from ash deposits. Whether damage will occur and how that will be expressed is dependent on the stage of crop development and the constituents of the ash. For example, if it contained a high percentage of sulphur (acidic), then burning of young leaves, flowers or fruit is possible.

The depth of ash is also a factor. For example, falls of less than 150 mm may restrict photosynthesis, while falls of 150 mm or greater are likely to result in structural damage to plants due to the weight of ash loading (especially if it gets damp) and severe root damage due to the soil surface being smothered.

Periods when crops are most at risk

For leafy vegetable crops (e.g. cabbage, broccoli, lettuce, etc), ash presence on the produce at the time of harvest will largely be a cosmetic issue. If it can be removed readily, then it is unlikely to affect marketability.

Many annual crops (e.g. peas, squash, sweetcorn, tomatoes, etc.) will be most affected during emergence, growth and flowering.

Deciduous fruit crops (e.g. pipfruit, stonefruit, kiwifruit, grapes, berryfruit) and perennial crops such as asparagus that do have a dormancy period will be most susceptible during the growing period - spring to autumn. However, evergreen fruit crops (e.g. avocado, citrus, etc.) will be susceptible to foliar and crop damage right through the year.

Possible strategies

With horticultural crops there is no simple answer. Overhead irrigation possibly provides the best option to wash ash off crops. Some have suggested using air blast sprayers (without spray) to blow the ash off. The high risk of accelerated wear on operating machinery needs to be taken into account when considering this option. Where the produce can stand it, thorough washing and rinsing following harvest and before packing for market is another possibility.

Effects on forestry

Damage to forestry can take several forms. Burial will affect plantations depending on age/size of trees and depth of ash. The younger the trees and deeper the ash, the greater the potential loss. Breakage of trees could result close to volcanic activity from heavy rock falls and heavy ash deposits. Because of different growth habits Douglas Fir may be less affected by ash falls than the more upright Radiata pine. Fires started by volcanic activity could result in more losses. Logs may be more prone to sap stain, and of less value due to volcanic contamination.

Possible strategies

Subject to safety of personnel, suitable access to the forest and availability of suitable water supplies and machinery for fire fighting may be the first priority. Salvage of damaged mature forests may be another option. Where trees have been uprooted and damaged it may not be economic to harvest them, except as the first step in reforestation.

“A major volcanic eruption resulting in substantial ash deposits will create problems for farmers. However, prudent planning now could result in less inconvenience and loss if it does happen.”

Other problems following volcanic activity

Roof collapse: There may be a danger from the weight of tephra on roofs causing collapse. Tephra

“To limit the corrosive effects of the ash, vehicles and machinery should be covered if possible and washed down regularly to remove the deposits.”

is best removed by damping down the fine ash with a little water and sweeping with a broom. If too much water is used before sweeping, the resultant slurries may set hard like concrete, possibly blocking stormwater systems. Once the majority of material is swept away it is safe to wash down the roof with copious quantities of water.

Machinery at risk

Even when exposed to relatively small amounts of ash, precautions in the maintenance of machinery should be considered. The impact of volcanic ash on farm machinery, particularly on dairy farms, is likely to be severe. Farm pumps may experience rapid wear on seals and bearings, and the ash is likely to clog all moving parts.

Internal combustion engines are also at risk. Problems develop from blocked air and fuel filters. The highly abrasive nature of the ash leads to increased wear as it gets into virtually everything. You may like to try some nylon stockings over the air intake, which should help filter out some material. Fluid changes and replacing filters at more regular intervals should also be considered. Ensuring you have a good supply of new filters and oil on hand would be prudent.

To limit the corrosive effects of the ash, vehicles and machinery should be covered if possible and washed down regularly to remove the deposits.

Be particularly careful when removing the dust from windscreens as the ash and water can create a grinding paste which can damage the surface. Early tephra from the 1995 Ruapehu eruption was analysed as being predominantly silica, similar to small particles of glass.

You need to plan to get feed to stock. Overseas experience shows a dramatic increase in mechanical failure when operating in a volcanic dust environment. More frequent servicing schedules would lower the risk of a major breakdown.

Other possible problems

Ash may interrupt telephone communications and disrupt radio and electrical services because ash particles penetrate contact breakers and induce shorts. In such situations electricity demand increases, and may induce overloading.

A major volcanic eruption resulting in substantial ash deposits will create problems for farmers. However, prudent planning now could result in less inconvenience and loss if it does happen.

MAF Policy Contacts

Hamilton: Philip Journeaux
Ph (07) 856 1824
Fax (07) 856 1825

Rotorua: John Vaney
Ph (07) 348 0089
Fax (07) 347 7173

Hastings: Gillian Mangin
Ph (06) 870 6304
Fax (06) 870 6305

Wellington: Dan Bolger
Ph (04) 819 0100
Fax (04) 819 0745



**Ministry of Agriculture
and Forestry**

Te Manatu Ahuwhenua,
Ngaherehere