

Working from the same page consistent messages for CDEM

PART B: Hazard-specific information



Ruapehu erupting in 1995. Photo: GNS

Volcanoes

- ▶ Learn about your community's risk from hazards created by volcanic eruptions.
- ▶ While you may be located far from a volcano, the ash from an explosive eruption could affect your area.
- ▶ Contact your local council or visit GNS Science's website www.gns.cri.nz to find out about the type of volcanic hazards that could affect your area and what you can do to prepare.

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CORE ACTION MESSAGES IN THIS CHAPTER (pp6–12)

- ▶ **Determine your risk.**
- ▶ **Get your household ready.**
- ▶ **Keep goggles and dust masks handy.**
- ▶ **Evacuate or take shelter.**
- ▶ **Stay inside.**
- ▶ **Protect your lungs and eyes.**

For general readiness, every household should create and practice a Household Emergency Plan and assemble and maintain Emergency Survival Items and a Getaway Kit. In addition, every household should take precautions and plan for and practice what to do if a volcanic eruption occurs.

Please note: Core Action Messages should be read in conjunction with the rest of the text in this chapter.

Awareness messages

What are volcanoes and what causes them?

A volcano is a landform that results from magma (molten rock within the earth) erupting at the surface. The size and shape of a volcano reflect how often it erupts, the size and type of eruptions, and the composition of the magma it produces. When pressure from gases within the molten rock becomes too great, gases drive the molten rock to the surface and an eruption occurs.

Why talk about volcanoes?

Volcanoes produce a wide variety of hazards that can kill people and destroy property. Volcanic eruptions fall into two broad types: explosive and quiet. Hazards from large explosive eruptions include widespread ashfall (sand and dust-sized pieces of fractured rock and glass), pyroclastic flows (very fast flowing mixtures of hot gases and volcanic rock) and massive lahars (volcanic mud flows - fast flowing mixtures of muddy water and volcanic rock) that can endanger people and property nearby as well as tens to hundreds of kilometres away. Eruptions can even affect the global climate. Hazards from quiet lava flows include fires, building and other structural collapse, and acidic gas clouds.

New Zealand has a high density of active volcanoes and a high frequency of eruptions. There are three major types of volcanoes in New Zealand:

Volcanic fields such as the Auckland Volcanic Field, which form when small eruptions occur over a wide area and are spaced over long time intervals. Each eruption builds a single small volcano, which usually does not erupt again. Thus, each succeeding eruption in the field occurs in a different place. This site cannot be predicted until the eruption is imminent.

Cone volcanoes such as Mt Ruapehu and Mt Taranaki, which are characterised by a series of small to large eruptions from roughly the same point on the earth's surface. The products of successive eruptions accumulate close to the vents to form a large cone, which is the volcano itself. Over a long period of time, several cones may form which overlap and build up. The cone shape can be modified by partial collapse due to oversteepening (Mt Taranaki is a good example) or by collapse of the summit area to form a caldera. Because the magma tends to follow the same route to the surface each time, sites of future eruptions can largely be predicted.

Caldera volcanoes such as Mayor Island, Okataina and Taupo, which have a history of infrequent moderate to very large eruptions. Eruptions at these volcanoes are occasionally so large that the ground surface collapses into the hole left behind by the emptying of the underground magma chamber. Lake Taupo occupies a caldera basin. The eruption of Taupo volcano around 1800 years ago was the biggest on Earth in the past 5000 years.

What damage can volcanoes cause?

Typically, a number of different types of hazards will result from a single volcanic eruption. These hazards can be divided into two categories:

Near-vent destructive hazards:

- pyroclastic falls (ashfall),
- pyroclastic flows
- lava flows
- lahars (volcanic mudflows) and flooding
- debris avalanches (volcanic landslides)
- volcanic gases.

And distant hazards (which may be damaging and/or disruptive):

- pyroclastic falls (ashfall),
- lahars

Volcanic eruptions can also cause other natural hazards, including earthquakes, wildfires, and (given certain conditions) tsunamis.

How can I protect myself from volcanic hazards?

You need to know the hazards associated with active and potentially active volcanoes where you live and visit. You must determine the varying degrees of your own risk and take actions to stay safe and protect your property.

Learning your community's warning system, developing and practicing a household evacuation plan and being prepared to shelter-in-place should be important parts of your plan.

What is the best source of information in case of a volcanic alert?

In New Zealand a system of volcanic alert levels is used to define the current status of each volcano. The alert levels range from 0 to 5. There are two tables, one for the frequently active volcanoes like Ruapehu and White Island, and one that deals with the reawakening of dormant volcanoes like Mayor Island, Tarawera or Taupo. The alert levels are used by the public and responding agencies to set their response. GNS Science is responsible for setting volcanic alert levels.

When there is a change in volcanic activity, such as observation of geophysical signals which indicate a volcano may erupt, GNS Science will issue a 'Scientific Alert Bulletin' and may change the volcanic alert level. The bulletins are released to the media, civil defence emergency management organisations, and posted on the GeoNet website available for public viewing (www.geonet.org.nz). If an eruption has occurred, the GeoNet website will also contain information on the likely dispersal of ashfall. In a volcanic emergency information will be broadcasted on radio and other media.

Frequently active cone volcanoes White Island, Tongariro-Ngauruhoe, Ruapehu, Kermadecs		VOLCANIC ALERT LEVEL	Reawakening volcanoes Northland, Auckland, Mayor Island, Rotorua, Okataina, Taupo, Egmont/Taranaki	
Volcano status	Indicative phenomena		Indicative phenomena	Volcano status
Usual dormant, or quiescent state	Typical background surface activity, seismicity, deformation and heat flow at low levels.	0	Typical background surface activity; deformation, seismicity, and heat flow at low levels.	Usual dormant, or quiescent state.
Signs of volcano unrest	Departure from typical background surface activity.		1	Apparent seismic, geodetic, thermal or other unrest indicators.
Minor eruptive activity	Onset of eruptive activity, accompanied by changes to monitored indicators.	2		Increase in number or intensity of unrest indicators (seismicity, deformation, heat flow and so on).
Significant local eruption in progress	Increased vigour of ongoing activity and monitored indicators. Significant effects on volcano, possible effects beyond.		3	Minor steam eruptions. High increasing trends of unrest indicators, significant effects on volcano, possible beyond.
Hazardous local eruption in progress	Significant change to ongoing activity and monitoring indicators. Effects beyond volcano.	4		Eruption of new magma. Sustained high levels of unrest indicators, significant effects beyond volcano.
Large hazardous eruption in progress	Destruction with major damage beyond volcano. Significant risk over wider areas.		5	Destruction with major damage beyond active volcano. Significant risk over wider areas.

Fig. 1 Different levels of volcanic activity (GNS Science)

Action messages

Be prepared for a volcanic eruption: protect yourself

CORE ACTION MESSAGES

- ▶ **Determine your risk.**
- ▶ **Get your household ready.**
- ▶ **Keep goggles and dust masks handy.**

For general readiness, every household should create and practice a Household Emergency Plan and assemble and maintain Emergency Survival Items and a Getaway Kit. In addition, every household should take precautions and plan for and practice what to do if a volcanic eruption occurs.

If you are at risk from volcanic activity, you should:

1. Learn about your community's warning systems and emergency plans. Different communities have different ways of providing warnings and different response plans.
2. Discuss volcanoes with members of your household ahead of time to reduce fear and to build a common understanding of how to respond.
3. Develop an evacuation plan for volcanic eruptions and make sure all members of your household know and practice it. Making plans at the last minute can be upsetting and wastes precious time.
4. Be sure to include your animals in your evacuation plan.
5. Have Emergency Survival Items on hand (**see** Emergency Survival Items and Getaway Kit section). In addition to these, essential items to stock before an ashfall include:
 - Dust masks and eye protection (**see** IVHHN Recommended Masks document at www.ivhnn.org).
 - Plastic wrap (to keep ash out of electronics).
 - Cleaning supplies such as a broom, vacuum cleaner with spare bags and filters, and a shovel.
 - Consider that you could be stuck in your vehicle, so store emergency supplies in your vehicle too.

Actions to be taken in readiness:

6. Close doors and windows.
7. Place damp towels at door thresholds and other sources of draughts. Tape draughty windows.
8. Protect sensitive electronics and do not uncover until the environment is totally ash-free.
9. Disconnect drainpipes/downspouts from gutters to stop drains clogging, and to allow ash and water to empty from gutters onto the ground.

10. If you use a rainwater collection system for your water supply, disconnect the tank prior to ash falling.
11. Put all machinery inside a garage or barn to protect it from volcanic ash. If buildings are not available, cover machinery with large tarps.
12. Bring animals and livestock into closed shelters to protect them from breathing volcanic ash, particularly sheep as their fleece can become contaminated with ash and weigh them down, increasing their stress. Cover stock feed to avoid consumption of ash. This can cause blockages in their gut.
13. Evacuate livestock early to paddocks that are elevated and up wind from the volcano. Ensure they have clean food and water.
14. If you have children, know your school's emergency plan and have indoor games and activities ready.

What to do during a volcanic eruption

CORE ACTION MESSAGES

- ▶ Evacuate or take shelter.

During an eruption:

15. Don't panic – stay calm.
16. Stay indoors.
17. If you are caught in an ashfall:
 - Wear a dust mask designed to protect against lung irritation from small particles. If masks are unavailable use a handkerchief or cloth over your nose and mouth
 - Protect your eyes by wearing goggles. Wear eyeglasses, not contact lenses as these will result in corneal abrasion.
 - Keep as much of your skin covered as possible.
 - If you have chronic bronchitis, emphysema or asthma, stay inside and avoid unnecessary exposure to the ash.
 - If outside, seek shelter (e.g. in a car or building).
18. Listen to a local radio station on a portable, battery-operated radio for updated emergency information and instructions. If the electricity is out, this may be your main source of information. Local officials will provide the most appropriate advice for your particular situation using local media outlets.
19. Follow any evacuation orders issued by authorities, and put your Household Emergency Plan into action. Although it may seem safe to stay at home and wait out an eruption, if you are in a hazard zone, doing so could be very dangerous. The best way to stay safe is to take the advice of local authorities.
20. If warning is given before ashfall starts, go home from work.

What to do during a volcanic eruption (continued)

21. If at work when ashfall starts, stay indoors until the ash has settled.
22. Do not tie up phone lines with non-emergency calls.
23. If there is ash in your water, let it settle and then use the clear water. If there is a lot of ash in the water supply, do not use your dishwasher or washing machine.
24. Water contaminated by ash will usually make drinking water unpalatable before it presents a health risk.
25. If indoors, close all window, doors, and dampers to limit the entry of volcanic ash.
26. Stay out of designated restricted zones. Effects of a volcanic eruption can be experienced many miles from a volcano.
27. Avoid low-lying areas, areas downwind of the volcano, and river valleys downstream of the volcano. Debris and ash will be carried by wind and gravity. Stay in areas where you will not be further exposed to volcanic eruption hazards. Trying to watch an erupting volcano up close is a deadly idea.

What to do after a volcanic eruption

CORE ACTION MESSAGES

- ▶ Stay inside.
- ▶ Protect your lungs and eyes.

You should:

28. Stay indoors and away from volcanic ashfall areas if possible. The fine, glassy pieces of volcanic ash can increase the health risks for children and people with respiratory conditions, such as asthma, chronic bronchitis, or emphysema.
29. Follow the same precautions as given for “What to Do During a Volcanic Eruption” (previous section).
30. When it is safe to go outside:
 - Clear roofs of ashfall. Ash is very heavy and can cause buildings to collapse, especially if made wet by rain. Exercise great caution when working on a roof.
 - Avoid driving in heavy ashfall. Driving will stir up volcanic ash that can clog engines and stall vehicles. Abrasion can damage moving parts, including bearings, brakes, and transmissions.
31. Keep animals indoors where possible. Wash animals’ paws and fur or skin to prevent their ingesting or inhaling ash while grooming themselves, and provide clean drinking water.
32. You may eat vegetables from the garden, but wash them first.

Why should we clean up the ash?

Volcanic ash is a great nuisance and gets everywhere in the house and office, including inside televisions, computers, cameras and other valuable equipment where it can cause irreparable damage. Ash is different from ordinary house dust. It's sharp, and angular structure causes it to scratch and abrade surfaces when it is removed by wiping or brushing. In wet weather the ash deposits are dampened down and the air can be clear, but in drier weather ash can easily be stirred up and remobilised by wind and traffic. As a result, suspended dust levels become much higher and can reach levels potentially harmful to health. Rainfall and wind are effective in removing the ash and grass and other plants will eventually bind it to the soil. However, with large ashfalls this process is very slow and the ash must be cleaned up and taken away from populated areas. In addition, wind may also bring ash into areas which were previously clean so ash may be present in the environment for months or even years following an eruption.

What precautions should be taken before cleaning up ash?

Those undertaking clean up operations should always wear effective dust masks (**see** IVHHN Recommended Masks document at www.ivhhn.org). In fine-ash environments, wear goggles or corrective eyeglasses instead of contact lenses to protect eyes from irritation. Lightly water down the ash deposits before they are removed by shovelling, being careful not to excessively wet the deposits on roofs, causing excess loading and danger of collapse. Dry brushing can produce very high exposure levels and should be avoided. Use extra precaution on ladders and roofs, and use a harness if possible. The ash makes surfaces much more slippery, consequently many people have died from falls while cleaning ash from their roofs. Be aware of the extra load caused by standing on an already overloaded roof - tread carefully. It is preferable to clean roofs before more than a few centimetres of ash have accumulated.

Cleaning up: Outside

Keep ash out of buildings, machinery, vehicles, downspouts, water supplies, and wastewater systems (for example, storm drains) as much as possible. The most effective method to prevent ash-induced damage to machinery is to shut down, close off or seal equipment until ash is removed from the immediate environment, though this may not be practical in all cases. Coordinate clean-up activities with your neighbours and community-wide operations. After an ashfall, remove ash from roofs prior to street cleaning if possible, in order to avoid having to clear streets numerous times.

DO:

33. Put on a recommended mask before starting to clean. If you don't have one, use a wet cloth. In dry conditions, wear eye protection (such as goggles) during clean-up.
34. Moisten the ash with a sprinkler first. This will help to stop the wind remobilizing it.
35. Use shovels for removing the bulk of thick deposits of ash (over 1 cm or so). Stiff brooms will be required to remove lesser amounts.

Cleaning up: Outside (continued)

36. Place the ash into heavy duty plastic bags, or onto trucks if available.
37. Since most roofs cannot support more than four inches (10 cm) of wet ash, keep roofs free of thick accumulation.
38. Volcanic ash is slippery. Use caution when climbing on ladders and roofs.
39. Guttering systems clog very easily so sweep away from the gutters, especially those fitted under roofs. Cut grass and hedges only after rain or light sprinkling, and bag clippings.
40. Seek advice from public officials regarding disposal of volcanic ash in your community. In most cases, ash should be separated from normal rubbish for collection for disposal at a designated location – mixing ash with normal rubbish can result in damage to collection vehicles and take up space in landfills.
41. Dampen ash in yards and streets to reduce suspension of ash, however try to use water sparingly – do not soak the ash. Widespread use of water for clean-up may deplete public water supplies. Follow requests from public officials regarding water use during clean-up operations.
42. Remove outdoor clothing before entering a building.

DON'T:

43. Do not soak the ash as it will cake into a hard mass, making clean-up more difficult. On roofs the added weight of the water will increase the risk of roof collapse.
44. Do not dump the ash in gardens or on the roadside.
45. Do not wash the ash into the guttering, sewers, effluent ponds or storm drains. It can damage waste water treatment systems and clog pipes.
46. Do not drive unless absolutely necessary – driving stirs up the ash. Furthermore, ash is harmful to vehicles.

Cleaning up: Inside

In general, surfaces should be vacuumed to remove as much ash as possible from carpets, furniture, office equipment, appliances, and other items. Portable vacuum systems equipped with high-efficiency particulate filtering systems are recommended whenever possible. The severity of ash intrusion depends on the integrity of windows and entrances, the air intake features, and the care exercised to control the transport of ash into a building or home via shoes and clothing. Care should also be taken to avoid further contamination during the emptying, cleaning, and maintenance of vacuum equipment. In hot climates, where there may be permanent openings in buildings, houses may need to be cleaned several times per day. Inside cleaning should only be undertaken after the outside areas have been well cleared.

DO:

47. Clean your house when public-works crews are cleaning the areas outside your house as a co-ordinated approach.

Cleaning up: Inside (continued)

48. Put on your mask before starting to clean. If you don't have one, use a wet cloth.
49. Ensure good ventilation by opening all doors and windows before you start to clean.
50. Only use one entrance to the building while cleaning to ensure occupants do not bring ash into clean areas.
51. Use a dustless method of cleaning such as washing with water and an effective detergent/wetting agent. Damp rag techniques or vacuuming should be used whenever possible. After vacuuming, carpets and upholstery may be cleaned with a detergent shampoo. Avoid excess rubbing action because the sharp ash particles may cut textile fibres.
52. Glass, porcelain enamel and acrylic surfaces may be scratched if wiped too vigorously. Use a detergent-soaked cloth or sponge, and dab rather than wipe.
53. High-shine wood finishes will be dulled by the fine grit. Vacuum surfaces and then blot with a wet cloth. A tack cloth used by furniture refinishers should also work well.
54. Ash-coated fabrics should either be rinsed under running water and then washed carefully, or they can be taken outside and beaten to remove the ash.
55. Moisten thick ash deposits on hard floors and place in bags (avoid sweeping dry ash).
56. Use a damp mop or wet cloth to clean hard floors.
57. Clean your computer, TV and radio equipment using a vacuum cleaner. Switch off the main power supply to the machine before carrying out this operation.
58. For several months after an ashfall, filters may need replacing often. Air conditioner and furnace filters need careful attention. Clean refrigerator air intakes. Clean any surface that may blow air and recirculate the ash. Stove fans and vents should be cleaned thoroughly.
59. Keep children indoors and discourage play in dusty settings.
60. Keep pets indoors. If pets go out, brush them before letting them indoors.

DON'T:

61. Do not use floor sweepers with side brushes to clear aisles and floors because they may reintroduce dust particles into the air.
62. Do not clean by blowing with compressed air or dry sweeping as ash will be remobilised into the air.
63. Do not use fans or electric clothes dryers which might remobilise ash.

Clean up and maintenance: Vehicles

64. If possible, avoid driving until streets are totally cleaned. Ash is harmful to vehicles, the roads may be slippery and driving suspends ash into the air which causes low visibility and may be harmful or irritating to others.
65. If driving is crucial, drive slowly, use headlights and ample windscreen fluid. Using wipers on dry ash may scratch the windscreen. In heavier ashfall, driving should only be undertaken in an emergency. Use water bottles and a cloth to clean the windscreen as required. This may be every few tens of metres.
66. Change oil, oil filters and air filters frequently (every 80-160 kilometres in heavy dust; every 800-1600 kilometres in light dust.)
67. Cleaning your car - clean ash from inside your engine, boot/trunk and spare tyre storage area as well as the seating area. Brushing ash off the car can cause scratching.
68. Have a service garage clean wheel brake assemblies every 80-160 kms for very severe road conditions, or every 320-800 kms for heavy dust conditions. The brake assemblies should be cleaned with compressed air (800-1600 kms) after ashfall.
69. Have a service garage clean alternators with compressed air after heavy accumulation, every 750 to 1500 kms, or after severe dust exposure.
70. Clean the vehicle, including the engine, radiator, and other essential parts daily, if necessary, using water to flush the ash.
71. Wash the engine compartment with a garden hose or steam cleaner. Be sure to seal off air intakes and electrical components before cleaning.

Further information

For further information on the health effects of volcanic emissions, visit the International Volcanic Health Hazard Network (IVHHN) website (www.ivhhn.org). Many resources, such as a guide to recommended dust masks, are available on the website.

Insurance

If your property sustains any damage:

72. Residential property damage caused by volcanic activity is covered by Earthquake Commission (EQC) insurance **providing** you already have house and/or contents insurance. If your property has been damaged, lodge a claim by calling 0800 326 243 or visit www.eqc.govt.nz.
73. If the value of damage to your property exceeds the limit of EQC cover, ring your insurer as soon as possible. In almost all cases the insurance company will send an insurance assessor to look at your property. They will confirm what repairs and replacements are needed and covered by your policy.
74. Photograph or video record your damaged property.
75. List the damage to your property and belongings.

Insurance (continued)

76. If your insurance policy covers you for loss of perishable goods, make a list of all the foods you throw away. Include anything in your fridge or freezer ruined by loss of power.

Ask the insurance company:

77. How long it will be before the assessor visits.
78. If they will provide you with temporary accommodation. This could be a nearby motel, bed and breakfast, a static caravan or a rented house.

Things to help with your insurance claim:

79. Confirm the insurance company will pay for any service or equipment you need.
80. Make a note of all telephone calls. Record the date, name and what was agreed.
81. Keep copies of all letters, emails and faxes you send and receive.
82. Keep receipts.
83. Don't throw anything away until told (except ruined food).
84. Depending on your policy, the insurance company may only offer to clean and repair something, not replace it.
85. If you rent your property, contact your landlord and your contents insurance company as soon as possible.
86. If you do not have insurance, your local council should be able to provide information on hardship grants or charities that may be able to help you.

Volcano general information

Media and community education ideas

Ask your local newspaper or radio or television station to:

87. Do a series on volcanic hazards.
88. Highlight the importance of staying informed about local conditions.
89. Run public information advertisements about how to protect lives in the event of a volcanic eruption.
90. Feature an interview with a local volcanologist, talking about how volcanoes are studied and monitored.
91. Work with local civil defence emergency management officials to prepare and disseminate guidelines for people with mobility impairments about what to do if they have to evacuate.

Fiction and fact

Fiction: Volcanoes erupt with regularity.

Facts: Volcanoes generally experience a period of closely spaced eruptions followed by long periods of quiet. Most volcanoes show no regularity and thus on the basis of past history alone cannot be considered 'overdue' for an eruption.

Fiction: Volcanoes are unpredictable, erupting at any time without warning.

Facts: Volcanoes usually give warning signs that they are going to erupt weeks to months or more in advance. Although we cannot predict when a volcano will start to be restless, once activity begins, scientists can make general forecasts about how soon an eruption will occur. More difficult challenges for volcanologists are forecasting the size of an impending eruption, and determining when activity will stop.

Fiction: Earthquakes cause volcanic eruptions.

Fact: Earthquakes indicate a geologically active landscape, but they are not the cause of volcanic eruptions. In rare cases, large tectonic earthquakes have triggered eruptions of nearby volcanoes that have been poised to erupt anyway.

Useful links

- www.gns.cri.nz
- www.teara.govt.nz/EarthSeaAndSky/NaturalHazardsAndDisasters/Volcanoes/en
- www.rural-support.org.nz/
- www.maf.govt.nz/mafnet/rural-nz/adverse-events/volcanoes/index.htm
- www.maf.govt.nz/mafnet/rural-nz/adverse-events/

Volcano general information

Useful numbers

Your important emergency household plan telephone numbers. Fill this out and keep this leaflet with your emergency items.

Contact	Details
Local authority emergency helpline	
Insurance company 24-hour	
Insurance number and policy number	
Local radio station (Frequency)	
School	
Family and neighbours	
Bank phone number and details	
Work phone numbers	
Medical Center/GP	
Local police station	
Vet/kennel/cattery/livestock transporter	
Local hotel or B&B	
Gas supplier and meter number	
Electricity supplier and meter number	
Water supplier and meter number	
Electrician	
Plumber	
Builder	

