



PART 6: LOCAL HAZARD SUPPLEMENT (10 MINUTES)

Volcano Preparedness

Learning Objectives

- Students will be able to explain what causes a volcano eruption.
- Students will understand what happens during a volcano eruption and the risks involved.
- Students will learn the best ways to stay safe during a volcano eruption.

Key Facts for Presenters

- A volcano is a mountain formed over a vent that opens downward to a reservoir of molten rock below the surface of the earth. Unlike most mountains, which are pushed up from below, volcanoes are built up when pressure drives molten rock to the surface where it accumulates as lava and ash.
- Volcano eruptions can be quiet or explosive, and can produce lava flows, mudflows, pyroclastic flows, flying rock, poisonous gases, flattened landscapes, and widespread ashfall. Volcano eruptions can be accompanied by earthquakes, landslides, flash floods, wildfires, and tsunamis.
- Lava flows burn and crush everything in their path, but most are slow moving and can be avoided.
- Volcanic mudflows (also called *lahars*) are formed when water combines with falling ash and soil to create a wet-concrete-like mixture that flows down river and stream channels at speeds up to 40 miles per hour and as far as 50 miles from the volcano, engulfing everything in its path.
- Volcanic ash (also called *tephra*) is pulverized rock that can travel hundreds of miles downwind from an eruption. Ash can cause respiratory problems, clog and damage machinery, and cause buildings to collapse when it piles up on the roof.
- There are approximately 169 active volcanoes in the United States. Most are located in Alaska, where an eruption occurs almost every year, and in Hawaii, where the Kilauea volcano has been erupting almost continuously since 1983. Many volcanoes are also found in the Cascade mountain range that runs from northern California into western Canada.
- Scientists monitor volcano activity and provide warnings of impending eruptions. When a volcano warning is issued, families should listen to the news and leave home immediately if an evacuation is ordered by local authorities.
- During a volcano warning or eruption, evacuate by a route that avoids areas downwind of the volcano and river valleys downstream from the volcano, in order to avoid ashfall and mudflows.
- If you hear the roar of an approaching mudflow, move immediately to higher ground. Mudflows can destroy buildings and bridges.
- During and after a volcano eruption, protect yourself from ashfall by wearing a long-sleeve shirt and long pants, goggles, and a dust mask – or hold a damp cloth over your nose and mouth. Adults should avoid driving, because volcanic ash can stall the engine. If possible, adults should remove ash from building roofs to prevent their collapse.



PRESENTER NOTES	SCRIPT
<p>Be sure to look up the names of two active volcanoes in your region.</p> <p>Use the bullet point appropriate for your region and refer to the Hazards Map poster.</p>	<p>Ask students:</p> <ul style="list-style-type: none"> ➔ Does anyone know the names of any volcanoes in our region? <p>Call on 1-2 students for a response.</p> <p>Explain why volcano preparedness is important in your region:</p> <ul style="list-style-type: none"> ➔ That's right! _____ and _____ are both active volcanoes. In fact,... ➔ Alaska has more active volcanoes than anywhere else in the U.S., and there is an eruption somewhere in the state almost every year. ➔ The Hawaiian Islands were created by volcanoes, and Kilauea on the Big Island has been erupting almost continuously since 1983. ➔ There are volcanoes all along the Cascade Range, and while they don't erupt very often, they can be very destructive, like Mount St. Helens in 1980. ➔ So it's important for everyone in our region to learn about volcanoes and find out how to stay safe when an eruption occurs.
<p>Some volcanoes also produce devastating pyroclastic flows, currents of hot gas (1000°F) that reach speeds moving away from the volcano of up to 450 mph.</p>	<p>Ask students:</p> <ul style="list-style-type: none"> ➔ Can anyone tell us what causes a volcano eruption? <p>Call on 1-2 students for a response.</p> <p>Explain what happens during a volcano eruption:</p> <ul style="list-style-type: none"> ➔ That's very good! Volcanoes are mountains formed by hot, melted rock that gets pushed up from below the surface of the earth through an opening in the ground called a vent. When the melted rock hits the surface of the earth, that's an eruption. ➔ A volcano eruption can be what scientists call "quiet" – mostly a steady, slow-moving flow of hot, melted rock that's called lava. Or the eruption can be "explosive," producing lava, flying rock, and a cloud of pulverized rock dust called ash that can travel hundreds of miles on the wind. ➔ The lava from any erupting volcano can cause wildfires, and the heat of an eruption can cause mudflows – that's when water mixes with volcanic ash and dirt to create a muddy mixture that looks like wet concrete. Mudflows move fast, up to 40 miles per hour, along rivers and streams, and they can travel as far as 50 miles away from the volcano, causing floods and crushing anything in their path.
	<p>Tell students how to be prepared for a volcano eruption:</p> <ul style="list-style-type: none"> ➔ Anyone who lives near a volcano, like us, should be prepared to get away whenever the volcano is ready to erupt. ➔ Scientists monitor all volcanoes the United States and provide warnings when a volcano is getting ready to erupt, usually days or weeks in advance.

PRESENTER NOTES	SCRIPT
	<p>Tell students how to be prepared for a volcano eruption (continued):</p> <ul style="list-style-type: none"> → <i>During a volcano warning, local authorities evacuate communities that are in the likely path of lava flows or mudflows, and communities that are downwind of the volcano, where they will likely be covered by volcanic ash.</i> → <i>If your family is ordered to evacuate, leave home immediately. Try to take an evacuation route that avoids rivers and streams that could become filled by a mudflow. And try to stay upwind from the volcano, to avoid the ash.</i>
	<p>Explain how to avoid risks from mudflows and volcanic ash:</p> <ul style="list-style-type: none"> → <i>Remember, mudflows move fast! If you ever hear one roaring toward you, get out of the way immediately by heading for higher ground. Mudflows can knock over buildings and bridges, so the only safe place is up on higher ground.</i> → <i>And remember that volcanic ash can travel hundreds of miles downwind after an eruption. So even if you live far from a volcano, you should be prepared to protect yourself from falling ash.</i> <ul style="list-style-type: none"> • <i>Wear a long-sleeve shirt, long pants, and sturdy shoes (not sandals) to keep ash off your skin. And it's a good idea to have goggles and dust masks ready for everyone in your home, to keep the ash out of your eyes and lungs. If you don't have a dust mask, cover your mouth and nose with a damp cloth.</i> • <i>Ash can get sucked into a car engine and cause it to stall, so remind grownups to avoid driving. And when ash piles up, it can cause a roof to collapse, so grownups should brush it off the roof whenever possible. Also, keep doors, windows, and any other openings in your home closed to prevent ash from getting inside.</i>
	<p>Lead students in one of the Practice Activities on the next page.</p> <ul style="list-style-type: none"> → <i>So, are you ready to practice what we've learned about being prepared for volcanoes?</i>
	<p>Lead students in one of the Sharing Activities on the next page.</p> <ul style="list-style-type: none"> → <i>Now let's share what we've learned.</i>
	<p>Wrap-up with a review:</p> <ul style="list-style-type: none"> → <i>What should you do when there is a volcano warning?</i> A: <i>Leave home immediately if you are ordered to evacuate.</i> → <i>What should you do if you hear a mudflow roaring toward you?</i> A: <i>Get out of the way by heading for higher ground.</i> → <i>What should you do to protect yourself from volcanic ash?</i> A: <i>Wear a long-sleeve shirt and long pants, goggles, and a dust mask – or breathe through a damp cloth.</i>
	<p>Transition:</p> <ul style="list-style-type: none"> → <i>So, now you're prepared for a volcano eruption. But remember, you need to share what you've learned to help everyone be prepared. So later today, remind someone that, around here, we all have to be prepared for a volcano eruption. Even better, when you go home, share what you've learned and make a plan to stay safe if there's a volcano warning!</i>

Volcano Preparedness Activities

Practice Activities

• Practice Dash

Divide students into teams of 5-6 for a takeoff on "Jeopardy." Explain that you will read an answer and that the student teams will compete by having one team member race toward you for the chance to give the correct question. The first student to arrive gives the question and wins a point for his/her team if correct, or loses a point if incorrect. Encourage students to figure out the correct question as a team before sending their runner toward you. Example answers and questions:

1. Lava	What is the hot, melted rock that flows from an erupting volcano?
2. A mixture of melted snow and volcanic ash	What is a mudflow?
3. Pulverized rock dust	What is volcanic ash?
4. Hundreds of miles on the wind	How far can volcanic ash travel?
5. Get to higher ground	What should you do to escape an approaching mudflow?
6. Long-sleeve shirt and long pants	What should you wear to protect your skin from volcanic ash?

• Lahar in a Jar

Demonstrate to students how it takes relatively little water mixed with a dry material like volcanic ash to produce a mudflow (lahar). You can use pancake mix, plaster of Paris, or dry spackle for this demonstration, pouring in a small amount of water and stirring each time until the dust transforms from a clotted mixture into a batter-like fluid that flows easily. For a more scientific demonstration, prepare a mixture ahead of time that is 1 part driveway gravel, 1 part garden soil (a high clay content works best), 1.5 parts sand, and .5 parts potters clay powder (available from a pottery supply store).

Sharing Activities

Divide students into small groups of 5-6 each and appoint a spokesperson for each group. Have all groups discuss one of the scenarios below and come up with ideas for what to do in that situation. Have the group spokesperson report on each group's ideas, then lead a whole group discussion to decide on the best way to handle the situation.

• Cleaning Up

Johanna and her family had to evacuate when the volcano near their home started erupting. They had been prepared for this and got out fast, heading upwind from the volcano and staying away from downstream rivers and streams. They stayed with Johanna's cousin for a few days, until the authorities said they could go back home.

Johanna was worried that the volcano might have destroyed her home, so she was happy to see that it was still standing. But then she saw the mess! Volcanic ash covered everything – the lawn, the driveway, the roof. There was even ash inside, on the floors and furniture, and Johanna found ash on her bed! Her parents said they'd have to stay at her cousin's a few more days until they could get things cleaned up, and that made Johanna really upset. She wanted to stay in her own home. But then she remembered from The Pillowcase Project that it's OK to feel upset and have troubled thoughts during an emergency – everyone does. And she remembered that there are things she could do to help her cope with those thoughts and feelings.

What coping skills could Johanna use to help her cope with this emergency, and her thoughts and feelings about what had happened and how hard it was going to be to get back home?

Answer:

- Taking slow breaths to stay calm.
- Bringing a buddy, like her cousin, to help with the clean up, so she won't feel alone.
- Singing a favorite song with her family while they clean up, or telling each other favorite stories, so she doesn't think so much about how she feels.
- Reminding each other how working together helps everyone get through a tough situation like cleaning up after a volcano eruption.
- Remembering that she knows how to protect herself from the volcanic ash by wearing a long-sleeve shirt and long pants, with goggles and a dust mask to keep the ash from getting into her eyes and lungs.
- Listening to grownups for other ways to help each other bounce back from this emergency.

• Why Be Prepared?

Stillwater is a town located about 15 miles from a volcano. But no one who lives there has ever seen a volcano eruption. Scientists say that the volcano erupted 2,000 years ago and created a mudflow ten feet deep that roared through Stillwater Valley. Since then, nothing except little rumblings that the scientists can measure with their instruments but no one in Stillwater can feel. So why should the kids in Stillwater have to learn about being prepared for a volcano eruption?

Work with your group to come up with an answer to this question. What would you say to the kids in Stillwater to help them understand why they should be prepared?

Answer:

Stillwater's history proves that a volcano eruption can be devastating, and scientists have evidence that another eruption could happen at any time. Even though Stillwater might be safe for hundreds of years, everyone who lives there should know what to do in case the volcano erupts again. The risk is too great to ignore.



REPRODUCIBLE MASTER

Volcano Preparedness

Sharing Activities

Read the activity assigned to your group. Then talk with the members of your group to come up with ideas for that situation. Help the spokesperson for your group take notes on the group's ideas. After your spokesperson shares your group's ideas with the class, join in the discussion to decide on the best ideas for the situation.

• Cleaning Up

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Student Pre-Assessment

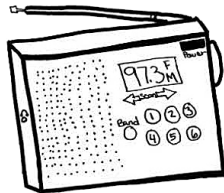
1. Circle all of the items that should be in the emergency supplies kit you keep at home.



First Aid Kit



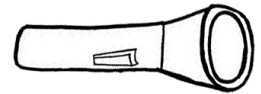
Fresh Fruit



Radio



Canned Food



Flashlight

2. How often should a grownup test the smoke alarms in your home?

A: Never

B: Once a month

C: Every Day

D: Don't know

3. What should you take with you when you are escaping from a home fire?

A: Nothing – just get out fast

B: Your pillowcase kit

C: Your home fire escape plan

D: Don't know

4. What can help you stay calm and relaxed during an emergency?

A: Breathing with color

B: Running around in circles

C: Holding your breath

D: Don't know

5. What should you wear to protect yourself from volcanic ash?

A: Shorts and sunglasses

B: Long pants and goggles

C: Sunscreen

D: Don't Know



Student Post-Assessment

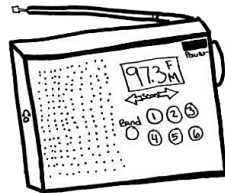
1. Circle all of the items that should be in the emergency supplies kit you keep at home.



First Aid Kit



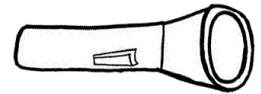
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D: Don't Know

6. Do you feel more prepared for an emergency? (Please circle yes or no)

Yes



No

