

Mt. St. Helens Volcanic Ashfall Eruption May 18, 1980

Overview

On May 18, 1980, Mt. St. Helens in the state of Washington exploded in a cloud of ash, plus lava and mud flows. What had been a beautiful symmetrical snow-covered mountain with heavily forested slopes became a startling landscape of ash, mud, and downed trees surrounding a broken, irregular peak. Geologists had been monitoring the mountain, and access to the area was restricted; still, 63 people were killed by the eruption, including a geologist who had been observing from a nearby ridge. The ash cloud reached 19 km (12 miles) into the atmosphere, where strong east winds scattered it across numerous states and cities.



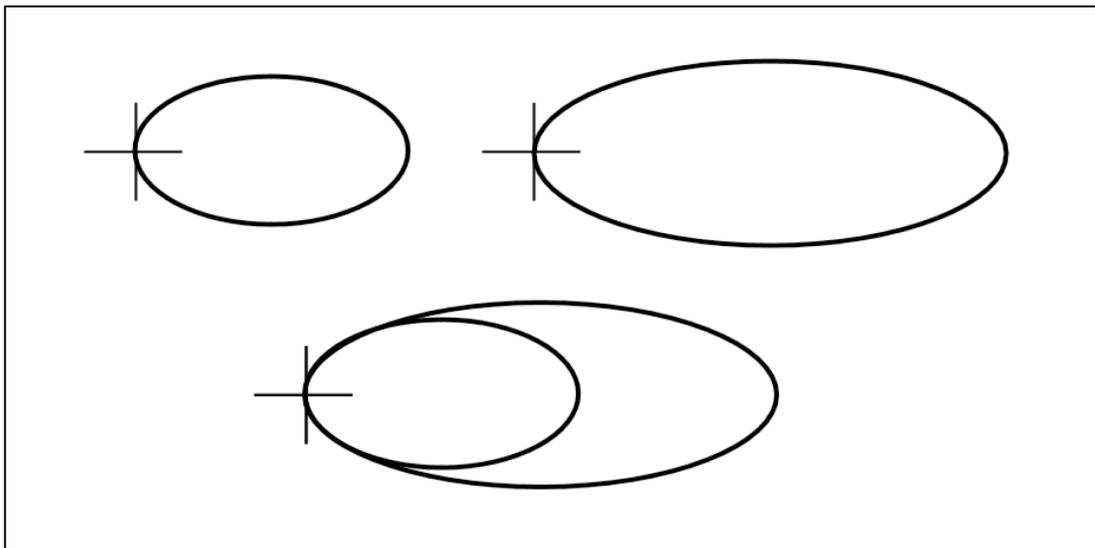
Ash column from the Mt. St. Helens May 18, 1980, eruption. Aerial view from the southwest.
Photo by the U.S. Geological Survey (USGS).

Learning objectives

- Describe the ashfall aspect of the 1980 eruption
- Draw the successive outlines of the ash cloud
- Calculate the velocity of ash movement
- Distinguish the affected and unaffected cities

Instructions

1. Open the Mt. St. Helens map file (PDF) that accompanies this exercise. The map shows all or parts of the states of Washington, Oregon, Idaho, Montana, and Wyoming. It also indicates the position of Mt. St. Helens (black triangle). Note that a north-south line and an east-west line intersect where the volcano is located. You will use the triangle and the lines to orient yourself as you proceed through this exercise. Print this map.
2. Open the Mt. St. Helens ash file (PDF) that accompanies this exercise. The two pages of this file contain eleven shapes that outline the edges of the ash cloud at various times after the eruption, as the wind carried the ash east and south. Each outline is marked with an open triangle that indicates the volcano, north-south and east-west lines like the ones on the map, and the time of that particular outline. Please note that the outlines are NOT arranged in order of time in this file. Print the outlines of the ash cloud.
3. Take a blank sheet of paper (the thinner the better – tracing paper works best), and lay it over the outline of the ash cloud at 8:45 AM on the first page of the ash file. Trace the shape of the ash cloud, starting near the upper left corner of your tracing paper. In addition, mark the position of the volcano, and trace the north-south and east-west lines associated with the 8:45 AM outline. Note that this small outline represents a time very soon after the eruption began at 8:32 AM.
4. Move your tracing to the shape for 9:45 AM, line up the volcano and the north-south and east-west lines, and trace again. You should now have the two outlines superimposed on your tracing paper, as illustrated in the simplified drawing below.



The upper two ovals represent two of the outlines for the ash cloud. In the lower image, these outlines have been superimposed to create the beginning of a composite drawing.

5. Continue at 1-hour intervals, making a composite image showing all eleven of the ash cloud outlines.

6. Lay your composite image of the ash cloud over the map that you printed in #1. Align the triangle representing the volcano and the north-south and east-west lines. List the cities shown on the map that were affected by the ash-fall.
7. In which city affected by the ashfall would you expect the accumulated ash layer to be thickest?
8. In which city affected by the ashfall would you expect the accumulated ash layer to be thinnest?
9. At what velocity did the ash travel from Mt. St. Helens to the city of Moscow, Idaho? The eruption began at 8:32 AM. Use the formula “distance = rate x time ($D = RT$)”, solve for R, and show your work.
10. At what velocity did the ash travel between Moscow, Idaho, and its farthest extent on your drawing? Show your work.



Ash from the 1980 Mt. St. Helens eruption collected 39 km (24 mi) downwind in Randle, WA. Volcanic ash looks and feels soft and powdery, but it actually consists of tiny sharp shards of volcanic glass. Thus, it can be harmful to people, machines, and structures. Photo by the USGS.