

Mount Rainier eruption scenario

[Instructor's note: this is compiled from a chronology of the Pinatubo eruption (E.W. Wolfe and R.P. Hoblitt, 1996, Overview of the Eruptions, in Fire and Mud: Eruptions and Lahars of Mount Pinatubo, Philippines, ed. C.G. Newhall and R.S. Punongbayan, available at <http://pubs.usgs.gov/pinatubo/wolfe/index.html>) with elements taken from the 1980 Mt. St. Helens eruption (R.L. Christiansen and D.W. Petersen, 1981, Chronology of the 1980 Eruption, in The 1980 eruptions of Mount St. Helens, Washington, ed. P.W. Lipman and D.W. Mullineaux, available at <http://pubs.er.usgs.gov/publication/pp1250>), as well as from the geological record of the Osceola Mudflow (http://volcanoes.usgs.gov/volcanoes/mount_rainier/mount_rainier_geo_hist_79.html) from Mount Rainier itself, but is ultimately a fictional eruption. Discussion with Pat Pringle (Centralia Community College) was helpful in designing this scenario.]

On June 15, Mount Rainier erupts. The eruption occurs in three phases.

Phase 1: Early in the morning of June 12, a series of tremors and eruptions shake Mt. Rainier. During this time, some small lahars are produced and a column of ash about 10 km tall is erupted from the vent.

Phase 2: Between June 12 and June 14, several pyroclastic flows cascade down the slopes of Mount Rainier. Vertical columns of ash are occasionally seen reaching as high as 20 km for brief intervals.

Phase 3: In the afternoon of June 15, a large vertical eruption triggers collapse of the weak west flank of Mt. Rainier, causing an avalanche of debris from the mountain. Debris is carried up to 10 km from the summit. This is followed by a tremendous lateral blast and the eruption of a column of ash 30 km high. Much of the ash is transported east by winds, covering Yakima, though western Washington was blanketed by a thin layer of ash as well.

Several large pyroclastic flows and surges occur between the time of the collapse and the evening of June 15. These travel as far as 25 km from the summit along the Nisqually River valley, where flows are channeled by steep topography. Pyroclastic flows reach the town of Ashford, just outside the entrance to Mount Rainier National Park.

During this last phase, lahars fed by melting glaciers flow along most major drainages from Mount Rainier. To the west, the Nisqually, Carbon/Puyallup, and White/Green River basins are most significantly affected. Lahars reach Puget Sound at Commencement Bay (Tacoma) and the Nisqually Estuary. Along the Green/Duwamish Rivers between the Kent Valley and Seattle, flooding and high sediment load associated with the lahars causes extensive damage. To the southeast, lahars flow down the Cowlitz River basin.

Damage to major infrastructure includes the following:

- Lahars cut off all major roads, including Interstate 5, between Seattle and Tacoma, as well as between Tacoma and the state capital in Olympia. Because the lahar damage was primarily south of the SEA-TAC airport, Seattle's connection with its airport remained intact.
- On most other roads, ash from the volcano is a driving hazard.
- Flights at SEA-TAC and all other nearby airports and military installations are grounded until ash was removed.
- Rail traffic is also disrupted. Most rail terminals in the areas south of Seattle as well as in Kent are flooded briefly. In Tacoma and Orting, rail service is permanently closed due to lahar damage.
- Commercial ship traffic into and out of Seattle is disrupted due to sediment discharge from the Duwamish river. Commercial shipping is completely stopped in Tacoma: all terminals are buried or partially buried by lahar sediment.

- Flooding causes damage to low-lying businesses in the area south of downtown Seattle as well as in Kent.
- Electrical transmission lines, which come to Seattle from north of the region affected by lahars, were not affected. Electrical distribution in the SoDo and port areas, however, was affected by flooding. Significant damage to dams along the affected river systems (Nisqually, Carbon/Puyallup, Green, Cowlitz) has cut power to the Puget Sound area south of Seattle and north of Olympia.