

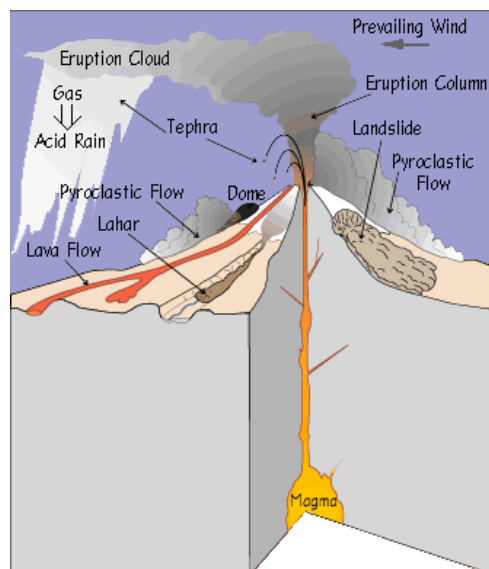
Section 18

Volcano Hazard Profile

Definition

A volcano is a vent in the earth's crust that eject magma, rock fragments, gasses and ash from the earth's interior. Over time, accumulations of these erupted products on the earth's surface create a volcanic mountain. (Washington State Hazard Mitigation Plan. Tab 7.1.8 - p.1)

Figure 12
Volcano Hazards



Source: USGS Fact Sheet 002-97

Description

There are no volcanoes in Grays Harbor County, but volcanoes dominate the Cascade Mountain Range approximately 60 miles to the east. Mt. Rainier is considered the “giant” of the Cascade Range volcanoes and the consequences of a major eruption would be cataclysmic for the entire Pacific Northwest. Mt. St. Helens, located in southwest Washington State, is currently the most active volcano in the Cascade Range. An eruption from either Mt. Rainier or Mt. St. Helens could be expected to affect the

County to some degree, how much depends on the magnitude of the eruption, size of the eruption column and prevailing winds. Based on a history of intermittent activity at Mt. St. Helens, scientists feel the mountain poses a hazard for the foreseeable future.

A large scale volcanic eruption is extremely rare and Grays Harbor County is not vulnerable to any direct impacts from an initial blast or mud flows; however, impacts related to ash fall from a large eruption could be widespread based on the direction of prevailing winds. The immediate danger area around a volcano is approximately 20 miles while ash fall problems may occur as much as 100 miles or more from a volcano's location. Ash fall, while a secondary impact, is the factor of most concern to Grays Harbor County.

Grays Harbor County is vulnerable to ash fall from a volcanic plume. Wind direction and speed influence the dispersal pattern of falling ash. Generally wind patterns along the coastal plain toward the Cascade Range are south and southwest which would direct an ash cloud from a volcanic eruption in the Cascade Range toward the east. Winds from the southeast or east would carry ash fall to the county.

Table 115
Characteristics of a volcanic eruption on Grays Harbor County

- Prevailing high altitude winds from the southeast or east
- Slight to heavy ash fall
- Ash accumulation
- Reduced visibility

The amount of ash fall is directly related to the size of an eruption. Volcanic ash is composed of tiny pieces of rock and glass. The size of ash particles and the thickness of deposits decrease in size as they spread farther from the erupting volcano. Falling ash initially appears as a dusty haze, often a murky yellow or gray color and can even turn daylight into darkness. Ash fall will progress from east to west over the county.

History

Mt. St. Helens

Observation by local Indians and early settlers as well as scientific studies indicates Mt. St. Helens has been active overtime. Explorers, trader and missionaries all heard reports of a major explosive eruption about 1800. Other descriptions indicating possible activity included: a physician at Fort Vancouver writing of darkness and haze in 1831

and reports by Reverend Josiah Parrish, corroborated by missionaries at the Dalles, Oregon of an eruption.

Table 116
Historical Reports of Volcanic Activity on Mt. St. Helens

Date	Activity
1480	Pumice, pyroclastic flows, lava, and mudflows
1600 -1700	Voluminous flow of lava
1800 - 1802	Explosive volcanic event
1831	Steam and ash eruption
1835	Steam and ash eruption
1842 - 1844	Mud flows, pumice and lava flows
1947 - 1854	Intermittent steam and ash eruptions
1857	Last 19th century eruption

Source: Columbia River Chronology, Historical Dates. Pacific County Historical Society and Museum

An eruption of Mt. St. Helens in 1980 is the only completely documented volcanic event to affect Grays Harbor County. After about a 150-year time span, a catastrophic eruption occurred on May 18, 1980. A new period of unrest began in September of 2004. Initial increases in seismic activity were followed by magma rising to the surface on September 23rd. After 14 days, new lava was visible and seismic activity and dome building continues to the date of this report.

The May 18th eruption carried huge amounts of ash to the east all the way to the State of Montana in the matter of hours. Grays Harbor County escaped the initial ash fall because of prevailing wind direction; however, a smaller but significant eruption on May 25th affected the county for a short period of time. Prevailing winds from the southeast during this eruption deposited ash from the volcanic plume over Grays Harbor County from east to west.

Effects

The expected consequence of a major volcanic eruption with prevailing winds from the east on Grays Harbor County is ash fall. Any accumulations of volcanic ash can create traffic problems, damage machinery and electronics, clog sewage disposal systems, and contaminate water treatment plants. Ash particles can affect public health and, in extreme cases, cause death. Several of the deaths from the Mt. St. Helens eruption were attributed to ash inhalation. Additionally, ash is very difficult to clean up. There can be impacts without ash fall that are likely to involve services such as traffic management

and temporary shelters as highways and institutions closer by an eruption can be overwhelmed.

There was no direct impact to Grays Harbor County from the May 18, 1980 eruption of Mt. St. Helens; however, there were immediate effects. As the realization of the catastrophic nature of the eruption became clear, one of the necessary actions taken by state officials was to divert traffic. There were traffic jams in Montesano and Oakville due to the rerouting of Interstate 5. Traffic from Portland was rerouted to Astoria and then north adding to congestion on Highways 101 and 12 as people tried to reach destinations in the Puget Sound region.

Also of immediate concern was the potential need to house evacuees from the Longview Kelso area. Cowlitz County Emergency Services Director, Bill Langford, estimated there could be as many as 50,000 people in need of shelter. The local Red Cross made preparations to house evacuees at the Grays Harbor Fairgrounds and the old Armory in Aberdeen, but these facilities were not needed.

Ash fall from the May 25th eruption caused power outages, hazardous traveling conditions and stranded tourists. Rainfall did help keep the dust down minimizing damage to engines; although, it made many roads very slippery and muddy. The ash hit residents of East County the hardest. Oakville received $\frac{3}{4}$ inch of ash. In McCleary, an accumulation of ash of up to $\frac{1}{4}$ inch mixed with rain, coating the streets and creating hazardous driving conditions.

Traveling conditions were dangerous not only from slippery ash deposits, but also for a time, reduced visibility and speed limits were lowered on roads. Six school districts in East County were closed because of muddy roads and ash covered playgrounds. Sgt. John Weaver of the Washington State Patrol estimated there were up to 50,000 tourists celebrating Memorial Day at the coastal beaches. People choosing to leave the beaches on Sunday caused significant traffic jams, especially along Highway 12.

East County farmland received $\frac{1}{2}$ to $\frac{3}{4}$ inches of ash according to reports. Farmers, in the midst of harvesting cattle feed crops, were concerned the ash would cause problems with their machinery as well as limit yields. Some clover fields were knocked down, but other crops were not damaged. Milk production dropped, but this was only a temporary issue. Ash created a massive clean up problem for officials at the Satsop nuclear project. No damage was reported, but clean up took several days before construction could resume.

A number of people with chronic respiratory ailments were seen at the Grays Harbor Community Hospital. Initial health concerns did not materialize and no deaths were reported due to ash fall inhalation in the County.

Asset Vulnerability Analysis for Structures and People

A moderate amount of ash fall can affect the entire county, but it is probable that any injuries, fatalities, or damage to structures will decrease east to west. East County is most likely to experience problems with impacts decreasing toward the ocean beaches. A catastrophic eruption of Mount Rainier or Mount St. Helens with strong prevailing winds from the east could bring heavy ash fall across the entire County.

Table 117
Volcanic Ash Fall
District 1

Land Use	Number of Structures			Value of Structures in Dollars			Number of People		
	Total Number	Number Exposed to Hazard	Percent Exposed to Hazard	Total Value	Total Value Exposed to Hazard	Percent Exposed	Total People	Number Exposed to Hazard	Percent Exposed to Hazard
Residential	4,384	88	2.0%	356,814,110	7,176,282	2.0%	10,872	217	2.0%
Manufacturing	21	0	2.0%	49,266,847	985,337	2.0%			
Transportation, Communication & utilities	22	0	2.0%	102,451,430	2,049,029	2.0%			
Trade	38	1	2.0%	6,286,350	125,727	2.0%			
Services	62	1	2.0%	24,537,375	490,784	2.0%			
Cultural, Entertainment & Recreation	31	1	2.0%	10,697,220	213,944	2.0%			
Agriculture	277	6	2.0%	30,038,035	600,761	2.0%			
Fisheries & Forestry	126	3	2.0%	11,894,785	237,896	2.0%			
Structures on Undeveloped Lands	114	2	2.0%	33,638,240	672,765	2.0%			
TOTALS	5,075	102	2.0%	627,624,392	12,552,488	2.0%	10,872	217	2.0%

Table 118
Volcanic Ash Fall
District 2

Land Use	Number of Structures			Value of Structures in Dollars			Number of People		
	Total Number	Number Exposed to Hazard	Percent Exposed to Hazard	Total Value	Total Value Exposed to Hazard	Percent Exposed	Total People	Number Exposed to Hazard	Percent Exposed to Hazard
Residential	1,914	10	0.5%	138,115,404	690,577	0.5%	4,747	21	0.4%
Manufacturing	6	0	0.5%	75,389,901	376,950	0.5%			
Transportation, Communication & utilities	12	0	0.5%	4,374,935	21,875	0.5%			
Trade	34	0	0.5%	3,574,140	17,871	0.5%			
Services	45	0	0.5%	186,598,830	932,994	0.5%			
Cultural, Entertainment & Recreation	33	0	0.5%	8,833,645	44,168	0.5%			
Agriculture	27	0	0.5%	2,342,965	11,715	0.5%			

Fisheries & Forestry	46	0	0.5%	4,392,195	21,961	0.5%			
Structures on Undeveloped Lands	99	0	0.5%	3,827,925	19,140	0.5%			
TOTALS	2,216	11	0.5%	427,449,940	2,137,250	0.5%	4,747	21	0.4%

Table 119
Volcanic Ash Fall
District 3

Land Use	Number of Structures			Value of Structures in Dollars			Number of People		
	Total Number	Number Exposed to Hazard	Percent Exposed to Hazard	Total Value	Total Value Exposed to Hazard	Percent Exposed	Total People	Number Exposed to Hazard	Percent Exposed to Hazard
Residential	2,823	14	0.5%	172,086,580	860,433	0.5%	7,001	30	0.4%
Manufacturing	48	0	1.0%	9,766,936	48,835	0.5%			
Transportation, Communication & utilities	24	0	1.0%	18,374,255	91,871	0.5%			
Trade	65	1	1.0%	6,052,930	30,265	0.5%			
Services	153	2	1.0%	40,108,232	200,541	0.5%			
Cultural, Entertainment & Recreation	72	1	1.0%	18,680,430	93,402	0.5%			
Agriculture	24	0	1.0%	1,376,160	6,881	0.5%			
Fisheries & Forestry	80	1	1.0%	6,229,575	31,148	0.5%			
Structures on Undeveloped Lands	128	1	1.0%	4,231,935	21,160	0.5%			
TOTALS	3,417	34	1.0%	276,907,033	1,384,535	0.5%	7,001	30	0.4%

Table 120
Volcanic Ash Fall
All Districts

Land Use	Number of Structures			Value of Structures in Dollars			Number of People		
	Total Number	Number Exposed to Hazard	Percent Exposed to Hazard	Total Value	Total Value Exposed to Hazard	Percent Exposed	Total People	Number Exposed to Hazard	Percent Exposed to Hazard
Residential	9,131	111	1.2%	669,016,094	8,727,292	1.3%	22,620	239	1.1%
Manufacturing	75	1	1.2%	134,423,684	1,411,121	1.0%			
Transportation, Communication & utilities	58	1	1.3%	125,200,620	2,162,775	1.7%			
Trade	137	2	1.2%	15,913,420	173,862	1.1%			
Services	260	3	1.2%	251,244,437	1,624,283	0.65			
Cultural, Entertainment & Recreation	136	2	1.1%	38,311,295	351,515	0.9%			
Agriculture	328	6	1.8%	33,757,160	619,356	1.85			
Fisheries & Forestry	252	4	1.4%	22,516,555	291,005	1.3%			
Structures on Undeveloped Lands	341	4	1.2%	41,698,100	713,064	1.7%			
TOTALS	10,708	133	1.2%	1,331,981,365	16,074,273	1.2%	22,620	239	1.1%

**Table 121
Catastrophic Volcanic Ash Fall
District 1**

Land Use	Number of Structures			Value of Structures in Dollars			Number of People		
	Total Number	Number Exposed to Hazard	Percent Exposed to Hazard	Total Value	Total Value Exposed to Hazard	Percent Exposed	Total People	Number Exposed to Hazard	Percent Exposed to Hazard
Residential	4,384	219	5.0%	356,814,110	17,940,706	5.0%	10,872	544	5.0%
Manufacturing	21	1	5.0%	49,266,847	2,463,342	5.0%			
Transportation, Communication & utilities	22	1	5.0%	102,451,430	5,122,572	5.0%			
Trade	38	2	5.0%	6,286,350	314,318	5.0%			
Services	62	3	5.0%	24,537,375	1,226,869	5.0%			
Cultural, Entertainment & Recreation	31	2	5.0%	10,697,220	534,861	5.0%			
Agriculture	277	14	5.0%	30,038,035	1,501,902	5.0%			
Fisheries & Forestry	126	6	5.0%	11,894,785	594,739	5.0%			
Structures on Undeveloped Lands	114	6	5.0%	33,638,240	1,681,912	5.0%			
TOTALS	5,075	254	5.0%	627,624,392	31,381,330	5.0%	10,872	544	5.0%

**Table 122
Catastrophic Volcanic Ash Fall
District 2**

Land Use	Number of Structures			Value of Structures in Dollars			Number of People		
	Total Number	Number Exposed to Hazard	Percent Exposed to Hazard	Total Value	Total Value Exposed to Hazard	Percent Exposed	Total People	Number Exposed to Hazard	Percent Exposed to Hazard
Residential	1,914	38	2.0%	138,115,404	2,762,308	2.0%	4,747	82	1.7%
Manufacturing	6	0	2.0%	75,389,901	1,507,798	2.0%			
Transportation, Communication & utilities	12	0	2.0%	4,374,935	87,499	2.0%			
Trade	34	1	2.0%	3,574,140	71,483	2.0%			
Services	45	1	2.0%	186,598,830	3,731,977	2.0%			
Cultural, Entertainment & Recreation	33	1	2.0%	8,833,645	176,673	2.0%			
Agriculture	27	1	2.0%	2,342,965	46,859	2.0%			
Fisheries & Forestry	46	1	2.0%	4,392,195	87,844	2.0%			
Structures on Undeveloped Lands	99	2	2.0%	3,827,925	76,558	2.0%			
TOTALS	2,216	44	2.0%	427,449,940	8,548,999	2.0%	4,747	82	1.7%

**Table 123
Catastrophic Volcanic Ash Fall
District 3**

Land Use	Number of Structures			Value of Structures in Dollars			Number of People		
	Total Number	Number Exposed to Hazard	Percent Exposed to Hazard	Total Value	Total Value Exposed to Hazard	Percent Exposed	Total People	Number Exposed to Hazard	Percent Exposed to Hazard
Residential	2,823	56	2.0%	172,086,580	3,441,732	2.0%	7,001	121	1.7%
Manufacturing	48	1	2.0%	9,766,936	195,339	2.0%			
Transportation, Communication & utilities	24	0	2.0%	18,374,255	367,485	2.0%			
Trade	65	1	2.0%	6,052,930	121,059	2.0%			
Services	153	3	2.0%	40,108,232	802,165	2.0%			
Cultural, Entertainment & Recreation	72	1	2.0%	18,680,430	373,609	2.0%			
Agriculture	24	0	2.0%	1,376,160	27,523	2.0%			
Fisheries & Forestry	80	2	2.0%	6,229,575	124,592	2.0%			
Structures on Undeveloped Lands	128	3	2.0%	4,231,935	84,639	2.0%			
TOTALS	3,417	68	2.0%	276,907,033	5,538,141	2.0%	7,001	121	1.7%

**Table 124
Catastrophic Volcanic Ash Fall
All Districts**

Land Use	Number of Structures			Value of Structures in Dollars			Number of People		
	Total Number	Number Exposed to Hazard	Percent Exposed to Hazard	Total Value	Total Value Exposed to Hazard	Percent Exposed	Total People	Number Exposed to Hazard	Percent Exposed to Hazard
Residential	9,131	314	3.4%	669,016,094	24,144,745	3.6%	22,620	675	3.0%
Manufacturing	75	2	2.8%	134,423,684	4,166,479	3.1%			
Transportation, Communication & utilities	58	2	1.3%	125,200,620	5,577,555	4.5%			
Trade	137	4	2.8%	15,913,420	506,859	3.2%			
Services	260	7	2.7%	251,244,437	5,761,010	2.3%			
Cultural, Entertainment & Recreation	136	4	2.7%	38,311,295	1,085,142	2.8%			
Agriculture	328	15	4.5%	33,757,160	1,576,284	4.7%			
Fisheries & Forestry	252	9	3.5%	22,516,555	807,175	3.6%			
Structures on Undeveloped Lands	341	10	3.0%	41,698,100	1,843,109	4.4%			
TOTALS	10,708	366	3.4%	1,331,981,365	45,468,359	3.4%	22,620	675	3.0%

Asset Vulnerability Analysis for County and Critical Facilities

County Facilities and Major Arterials At-Risk to Volcano Hazards

All county facilities and major arterials are potentially at-risk to volcano ash fall.

Critical Facilities Serving County Government & Residents At-Risk to Volcano Hazards

All critical facilities are potentially at-risk to volcano ash fall.