TABLE 3-1. Potential hazards from future eruptions of Cascade volcanoes

	FLOWAGE PHENOMENA								ERUPTION OF TEPHRA	EMISSION OF VOLCANIC GASES
	Debris avalanches	Pyroclastic flows	Lateral blasts	Pyroclastic surges	Lava flows	Lava domes	Lahars	Floods		
ORIGIN AND CHARACTERISTICS	Result from failure of volcanic edifice. Move downslope away from volcano at high speed. Distribution is partly controlled by topography.	Can be caused by direct eruption of fragments of molten or hot solid rock, or by explosion or collapse of a lava dome or flow. Commonly occur suddenly and move away from volcano at tens of km to more than 100 km per hour. Distribution is mostly controlled by topography.	Result from explosive ejection of rock fragments with or without magma and steam. Commonly occur suddenly; ejected debris moves away from vent at hundreds of km per hour. Distribution controlled by direction of blast, only slightly influenced by topography.	Result from explosive magmatic or phreatic expulsion of rock fragments with steam or other hot gases. Pyroclastic surges commonly occur suddenly and ejected debris moves away from vent at hundreds of km per hour. Distribution controlled only slightly by topography.	Result from nonexplosive eruption of molten lava. Flows move down slope slowly, usually no faster than a person can walk. Distribution is controlled by topography.	Result from nonexplosive eruption of molten lava. Lava is erupted slowly and accumulates above the vent. Distribution limited to above and within a few km laterally from vent.	Commonly result from eruption of hot material onto snow and ice, and eruptive displacement of crater lakes. May also be derived from debris avalanches from volcano. Lahars commonly originate suddenly and move rapidly at tens of km per hour. Distribution controlled by topography.	Origin similar to origin of lahars. Lahars may grade downstream to floods. Commonly move at speeds of <20 km per hour. Distribution controlled by topography.	Produced by vertical expulsion of columns of fragments and gas into the air; materials can be carried great distances by wind. Commonly is erupted suddenly, and is carried away from vent at speeds of tens of km per hour. Distribution controlled by height to which erupted and wind direction and speed.	Produced by explosive or non explosive emission of gases from vent; gases may be hot and commonly contain sulfur and other harmful compounds. Gases commonly are carried by wind away from vent at speeds of tens of km per hour. Distribution controlled by wind direction and speed.
EFFECTS ON LAND AND OBJECTS	Burial, destruction by impact, or dislocation.	Burning, burial, impact damage, and dislodgement.	Burning, burial, impact damage, and dislodgement.	Burning, burial, impact damage, and dislodgement.	Burial or destruction. May start fires.	Near-vent areas subject to burning, burial, or destruction; distant land and objects may be destroyed by pyroclastic flows generated by explosion or collapse of dome.	Burial, dislodgement, and impact damage.	Dislodgement, impact damage, and inundation by water.	Near-vent areas subject to burial, loading, and infiltration by abrasive rock particles. Blanketing and infiltration effects can reach hundreds of km downwind.	Structures, equipment, people, animals, and vegetation can be damaged or destroyed by corrosive gases. Odor, "haze" and mild effects can extend hundreds of km downwind.
DEGREE OF RISK IN AFFECTED AREA	Extreme for both people and property near and downslope from source. Risk decreases gradually away from volcano.	Extreme for both people and property near erupting volcano. Risk to people high because of possible sudden origin and high speeds. Risk decreases gradually with distance from vent, and more abruptly with increasing height above valley floor.	Extreme for both people and property within 30 km of vent because of sudden onset and very high speeds. Risk decreases gradually away from vent, but does not depend on topographic position.	High for both people and property because of sudden onset and high speed. Risk decreases gradually away from from vent.	To people, low. To property, high.	To people, low. To property, high. Risk is greatest at vent and decreases rapidly away from the vent. Risk from dome-related pyroclastic flows may extend 15 km beyond vent.	Moderate to high for both people and property near erupting volcano. Risk decreases gradually with distance from vent and abruptly with with increasing height above valley floor.	Low to moderate for both people and property. Risk decreases gradually downvalley and abruptly with increasing height above valley floor.	Moderate to people and property near volcano. Risk decreases rapidly upwind and gradually downwind from vent.	Low to people and property. Risk decreases rapidly upwind and gradually downwind from vent.
LOCATION OF HAZARD	Areas downslope and downvalley from volcano. Large-volume debris avalanches, which occur only at large steep-sided volcanoes, may extend as far as 45 km	Beyond volcano flanks, effects may extend as far as 40 km downslope and 65 km downvalleys. Areas adjacent to pyroclastic flows may be affected for a distance of several km by clouds of hot ash.	Beyond volcano in a sector as wide as 180° that extends as far as 30 km from volcano. Ridge crests and valley floors may be affected about equally.	Areas within a distance of 10 km of vent. Topographically high and low areas may be affected about equally.	Restricted to areas downslope from vents, and most will reach distances <10 km. Flows occur repeatedly at central-vent volcanoes, but successive eruptions may affect different flanks. Elsewhere, flows occur at widely scattered sites, mostly within volcanic fields.	At vent and within a few km of vent. Pyroclastic flows resulting from collapse or explosion may extend downslope or downvalley as far as 15 km.	Beyond volcano flanks, effects mostly confined to floors of valleys and basins that head on volcanoes. Large, snow-covered volcanoes are principal sources. May extend tens to hundreds of km from source volcanoes.	Confined primarily to floors of valleys and basins that head on large, snow-covered volcanoes. May extend for hundreds of km downstream.	Areas near and downwind from volcanoes are susceptible. See Plates 2-4 for tephra-hazard zones.	All areas at and within a few hundred kilometers downwind from erupting volcanoes, or other gas-emitting vents.
PREDICTABILITY OF LOCATION OF ENDANGERED AREAS	Relatively predictable, because most originate at large, steep-sided volcanoes and are restricted to flanks of volcanoes, immediately adjacent areas, and valleys leading away from them.	Relatively predictable, because most originate at central-vent volcanoes or areas of past silicic volcanism. Pyroclastic flows are restricted to flanks of volcanoes and valleys leading from them.	Difficult to predict; may be predictable after eruption precursors begin. Deformation of volcano may indicate sector away from volcano most likely to be affected.	Difficult to predict. May occur wherever magma or hot rock reaches the water table or standing water, whether or not magma has erupted there before.	Relatively predictable near major Cascade Range volcanoes. Only general locations predictable within volcanic fields.	Relatively predictable because most originate in areas of past silicic volcanism and are restricted to small areas near vent.	Relatively predictable, because most originate at snow-covered volcanoes and are restricted to flanks of volcanoes and valleys leading from them.	Relatively predictable, because most originate at snow-covered volcanoes and are restricted to valley bottoms leading from them.	Moderately predictable. Voluminous tephra originates mostly at silicic volcanoes; its distribution depends mostly on winds. Tephra can be carried in any direction; probability of dispersal in various directions can be judged from wind records.	Moderately predictable, because most serious effects occur at or near erupting volcanoes. Distribution of gases away from vent depends on wind directions.
SIZE OF AREA AFFECTED BY SINGE EVENT	May cover areas ranging from a few tens to several hundred square km.	Generally cover a few square km to a few hundred square km.	Generally cover a few tens of square km to as much as 600 km^2.	Generally cover a few square km to several tens of square km.	Most cover no more than a few square km. Relatively large and rare flows probably would cover no more than a few tens of square km.	Generally cover no more than a few square km. Domes that spread farther considered to be lava flows.	Generally cover a few square km to a few hundred square km.	May affect a few square km to a few hundred square km.	An eruption with a volume of several km^3 could affect tens of thousands of square km and spread tephra over many states. An eruption of moderate volume (0.1-1.0 km^3) could affect many thousands of square km.	May affect several hundred square km. However, severe effects will be limited to a smaller area near the volcano.

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey standards and stratigraphic nomenclature.

By

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