

APR 3 1980

MEMORANDUM FOR: Robert E. Jackson, Chief
Geosciences Branch, DSS

FROM: Harold E. Lefevre, Geologist
Geology and Seismology Section
Geosciences Branch, DSS

SUBJECT: ERUPTION OF MOUNT ST. HELENS, A CASCADE VOLCANO
IN SOUTHWESTERN WASHINGTON STATE

Early Thursday afternoon, March 27, 1980, Mount St. Helens, a Cascade volcano inactive since 1857 erupted and emitted a small amount of ash. The volcano is located in southwestern Washington state approximately 35 miles northeast of the Trojan Nuclear Power Plant (see attached location map). Physical evidence of volcanic activity was preceded by a series of moderate earthquakes of Richter Magnitude 4.0 and less beginning on Thursday, March 20, 1980. Volcanic activity (ash-laden steam principally) has continued intermittently since that time. As of today (April 1, 1980) ash has been reported at distances ranging from 30 miles east to 90 miles southeast of the volcano. There have been scattered, unconfirmed reports of some ash at Portland, Oregon, some 45 miles south of Mount St. Helens. With the exception of a trace near the volcano summit no ash fall has been reported either to the west or to the southwest. The preceding information as well as the following has been gathered from a variety of sources including (1) the U. S. Geological Survey (2) geologists from the states of Oregon and Washington (3) the University of Washington and (4) the U. S. Forest Service. Pertinent information includes:

1. Subsequent to a Magnitude 4.0 (Richter) event on Thursday, March 20 seismic activity in the Mount St. Helens area has increased rapidly.
2. At least two events per hour were recorded early in the sequence (Thursday, March 20 through early Monday, March 24). By Monday noon an average of 40-50 events per hour were occurring. Between 3PM and 4PM on Tuesday, March 25, from three to four Magnitude 4.0 or so events per hour were occurring. by 4PM, EST Wednesday the frequency of Magnitude 4.0's had dropped to pre-Tuesday afternoon levels. However, the number of Magnitude 3.0's and less has increased dramatically such that the events could not be distinguished. At 4PM, Thursday, March 27, 6 to 7 events per hour of Magnitude 3.0 were being recorded. The two largest events, as reported by

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- the University of Washington, are of Magnitude 4.7. One occurred Monday evening, March 31; the other on April 1 at 4:23 AM. Magnitude 3.0's and greater are now occurring at a rate of 2 to 3 per hour. Events of less than Magnitude 3.0 are decreasing.
3. Seismic activity seems confined to an area beneath and northwest of the summit with focal depths ranging from 1km to as much as 10 km. The deeper events are quite rare.
 4. By Tuesday noon (April 1) 12 seismic instruments were at the site (1 permanent, 11 portable). The monitoring is being conducted by Dr. Steve Malone and Dr. Robert Crosson of the University of Washington and by Dr. Craig Weaver of the U. S. Geological Survey.
 5. The earthquakes (even the larger events) are felt only locally and then only if the observer is motionless. Groundmotion apparently cannot be detected if the observer is in a moving car. None have been either felt or recorded at the Trojan plant. The threshold of the on-site instruments (at least 12 internal and free-field) is 0.01g. All these instruments are operative and have been recently calibrated.
 6. In addition to venting (steam vapor and ash) other effects of the Mount St. Helens volcanism include (1) avalanches, (2) fissuring (up to 3 miles in length involving rupture of both ice and rock), (3) mudflows on the south and east flanks of the volcano, and (4) minimal melting of ice and snow.
 7. Monitoring at the Mount St. Helens site includes at least (1) seismometers, (2) tiltmeters, (3) aerial reconnaissance to observe snow conditions and possible abnormal melting, and (4) infra-red photography to detect "hot spots."
 8. Three reservoirs, located along the Lewis River on the southwest flank of the volcano, constitute a portion of a hydro-electric complex operated by Pacific Power and Light Company. As a precaution the water level of Swift Reservoir, the uppermost lake, is being lowered in order to accommodate a massive mudflow in the unlikely event one were to occur.
 9. The U. S. Forest Service has evacuated its own personnel from Gifford Pinchot National Forest within which Mount St. Helens is located as well as permanent civilian residents near Spirit Lake on the volcano's north flank. Residents have not been advised to evacuate the nearest community-Cougar, Washington (population 150) some 12 miles south of the volcano.

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10. The Trojan plant is now in a "coasting down" mode at about 65% of power (as of March 28) and is currently scheduled to shut down for refueling on April 9. The shutdown of the plant has no connection with either the earthquake sequence on March 20 or the volcanic activity on March 27. The planned shutdown had been initiated prior to the March 20 seismic activity at Mount St. Helens.

This represents highlights of the status of the seismic and volcanic activity at Mount St. Helens as of noon, Tuesday, April 1, 1980. Additional pertinent information will be disseminated by Harold E. Lefevre of the Geosciences Branch as the need develops.

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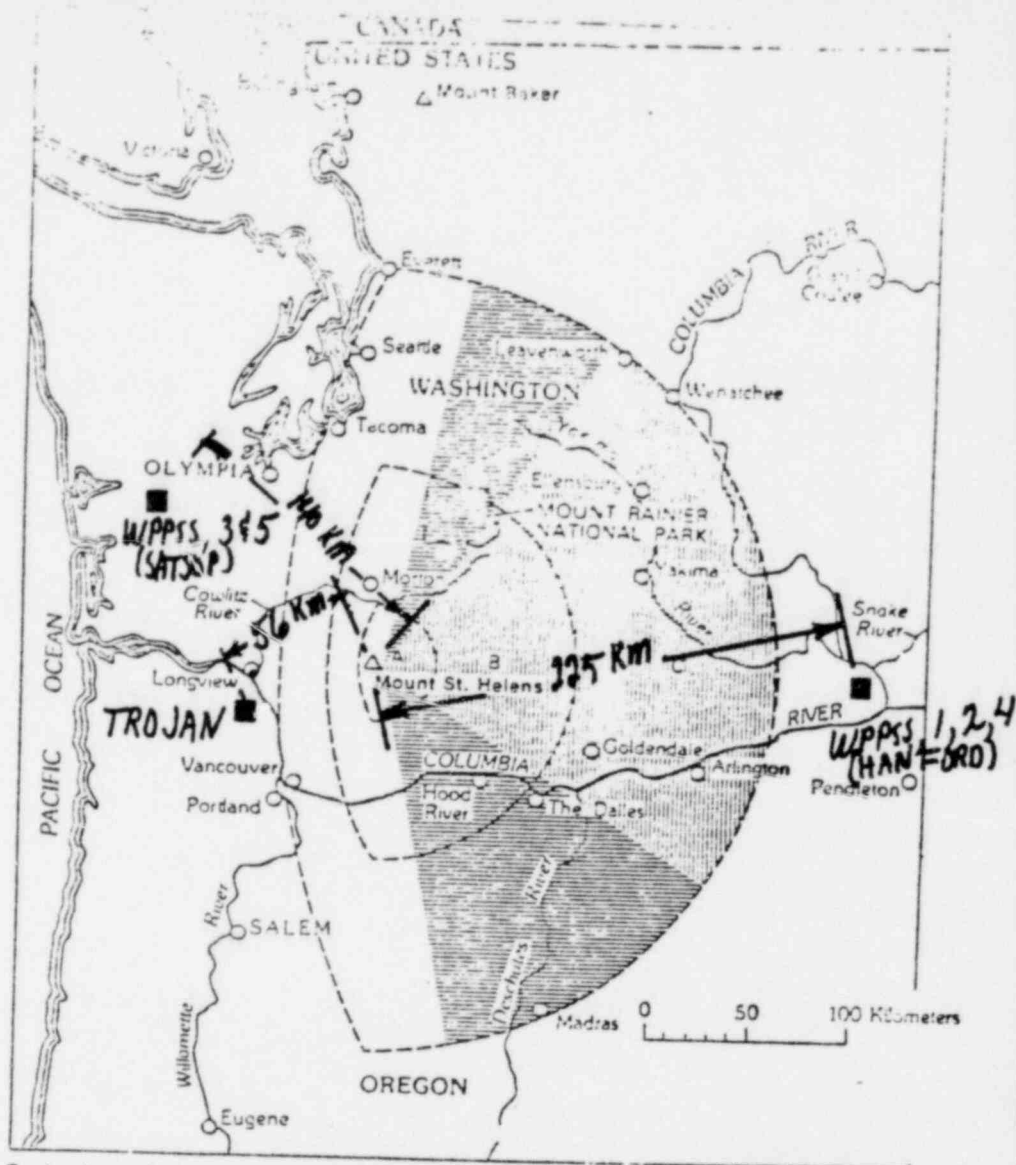
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Attachment:
As stated

- cc: w/attachment
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Tephra-hazard zones are outlined around Mt St Helens. Winds blow from the volcano toward the vertically and horizontally shaded sections of the map about 80% of the time, and toward the vertically shaded

section about 50% of the time. About once every 500 to 1,000 years, eruptions will produce layers of tephra 15 to 100 cm thick within zone A, and 2 to 15 cm thick within zone B. (U.S. Geological Survey map)

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