

MAR 11 1981  
WASHINGTON STATE UNIVERSITY

DEPARTMENT OF HEALTH AND HUMAN SERVICES  
PUBLIC HEALTH SERVICE  
CENTER FOR DISEASE CONTROL  
ATLANTA, GEORGIA 30333

CDC--MOUNT ST. HELENS VOLCANO HEALTH REPORT #13

July 11, 1980

Psychological Aspects of the Mount St. Helens Eruption

The psychological effects observed following other disasters such as the flood in Wilkesboro, Pennsylvania, are now being manifested by those segments of the population that have experienced heavy losses or are threatened by loss due to the Mount St. Helens eruptions. Some people are expressing feelings of depression, helplessness, and frustration. For this reason, we asked Calvin Frederick, Ph.D., National Institute of Mental Health, to comment on the psychological aspects of disasters; his comments follow:

Psychological reactions to the impact of major natural disasters such as floods, tornadoes, earthquakes, and volcanic eruptions produce post-traumatic stress disorders of both an acute and chronic nature. Common reactions include phobias, insomnia, anorexia, psychological disturbances, depression, and paranoid thinking. Such reactions will develop in varying degrees depending upon the intensity and duration of the stressor. Criteria for post-traumatic stress disorders include the following: a) presence of a recognizable stressor which would evoke symptoms of distress in nearly anyone; b) recounting and reexperiencing the event; c) reduced responsiveness or involvement with other persons; d) symptoms of distress which were not present prior to the disastrous event. In keeping with these reactions, the following kinds of symptoms may be noted: recurrent dreams of the event, feeling of detachment, constricted affect, hyperalertness or exaggerated startle response, sleep disturbances, guilt about not having experienced problems as severe as others, lack of concentration, memory impairment, and avoidance of activities which would arouse anxiety.

Few people panic, run amuck, or become overtly psychotic, but a variety of symptoms from those listed above tend to appear within 6 months of the event (acute type) or will have their onset 6 months or more after or will last more than 6 months from the date of the calamitous event (chronic type). These reactions appear in persons who were free of psychological disturbances before the catastrophe as well as those in whom psychopathology existed. In the geographic areas surrounding Mount St. Helens, emotional stress can be expected due to such phenomena as loss of property, income, or life; disturbance in the social fabric of the community (mobility problems, moving, wearing of masks); uncertainty about the future (recurrence of the eruption, problems with jobs, home, and environment); and worry about potential health hazards (pulmonary disorders, etc.). These problems need to be recognized and plans made for their amelioration.

Radionuclide Concentrations of the Volcanic Ash

The Eastern Environmental Radiation Facility, Office of Radiation Programs, Environmental Protection Agency (EPA), analyzed a sample of the Mount St. Helens volcanic ash for its radionuclide content. The sample was collected in Hanford, Washington, on May 19, 1980. Hanford is located approximately 150 miles east northeast of Mount St. Helens. The results of these radioanalytical analyses are shown below:



Radionuclide Concentration of the Ash  
(pCi/g)

<u><math>^7\text{Be}</math></u>	<u><math>^{40}\text{K}</math></u>	<u><math>^{234}\text{U}</math></u>	<u><math>^{235}\text{U}</math></u>	<u><math>^{238}\text{U}</math></u>	<u><math>^{226}\text{Ra}</math></u>
1.7+22%	8.1+17%	0.49+17%	0.07+38%	0.36+18%	1.2+5%
<u><math>^{227}\text{Th}</math></u>	<u><math>^{228}\text{Th}</math></u>	<u><math>^{230}\text{Th}</math></u>	<u><math>^{232}\text{Th}</math></u>	<u><math>^{210}\text{Po}</math></u>	<u><math>^{214}\text{Pb}</math></u>
0.09+52%	0.06+142%	0.29+20%	0.02+76%	0.39+27%	1.97+68%

Errors are relative, 2-sigma counting errors.

These values do not differ significantly from normal values for non-contaminated soil.

Radioanalytical analyses are currently being completed on air particulate samples from the Environmental Radiation Ambient Monitoring System--a national monitoring system operated by the Office of Radiation Programs, EPA. These samples were collected for the week of May 18 at stations in Bismark, North Dakota; Boise and Idaho Falls, Idaho; Cheyenne, Wyoming; Portland, Oregon; Seattle and Spokane, Washington; and Miami, Florida. A comprehensive report based on these analyses will be published soon. Preliminary results indicate minimal radiologic impact on health due to volcanic ash from Mount St. Helens.

Several chemical, radiochemical, and physical measurements on the Mount St. Helens ash have been made at the Lawrence Livermore National Laboratory by John Koranda, Ph.D., and others using x-ray fluorescence analysis for stable elements and gamma-ray spectroscopy for the radioactive constituents of the ash.

The gamma-emitting radionuclides determined in the ash by solid-state gamma-ray analysis were  $^{40}\text{K}$ ,  $^{226}\text{Ra}$ ,  $^{228}\text{Ra}$ , and  $^{228}\text{Th}$ . The  $^{40}\text{K}$  was present at approximately the same specific activity level as on the Earth's surface, namely at 1000 pCi per gram of potassium. The other 3 radionuclides are part of the decay chains of natural radionuclides, uranium, and thorium. The activity levels of these radionuclides appear to be approximately the same as in the surface soil and rock materials or slightly less.

The significance of the radionuclides in the Mount St. Helens ash lies primarily in the physical form of the ash in the depositional environment. The finely divided form of the ash allows it to be easily resuspended in the near-ground environment, either by human activities or by wind. Since human exposure under these conditions can be controlled or reduced by using respiratory equipment or reducing exposure, the effects of ash resuspension can be minimized. Comparison of the radionuclide content of the ash with stable soil surface levels, although the radionuclide concentrations are similar, is probably not valid because of the difference in potential resuspension.

Experiments with the Mount St. Helens ash to determine availability or leachability of ash constituents have shown that iron, manganese, calcium, potassium, and sodium are available in distilled water. In low normalities of acid, higher concentrations of aluminum, copper, iron, manganese, phosphorus, calcium, potassium, and magnesium are mobilized. Except for nitrogen, which was not analyzed, the Mount St. Helens ash appears to have the properties of a weak fertilizer, supplying modest amounts of the required elements--calcium, iron, phosphorus, manganese, potassium, and magnesium.



### Round Robin for Free Silica Analysis of Volcanic Ash

The Division of Physical Sciences and Engineering, National Institute for Occupational Safety and Health, CDC, is developing a round-robin program for crystalline silica analysis of volcanic ash. Laboratories currently analyzing the volcanic ash will be contacted, and any others are invited to participate. Each laboratory would be requested to analyze 4 settled-dust samples which have a particle size of <10 microns (i.e., respirable fraction) using their normal calibration standards for quartz and cristobalite. In addition, samples of quartz and cristobalite currently used in NIOSH laboratories would be sent to each laboratory for calibration purposes. Statistical analysis of the laboratory data will be accomplished using the statistical protocols developed under the Proficiency Analytical Testing Program (PAT). Laboratories wanting to participate should contact Donald Dollberg, Ph.D., or Charles Geraci, Ph.D., at 513-684-4217 or 684-4231.

### Recent Journal Articles on Mount St. Helens

Stoiber RE, Williams SN, Malinconico LL. Mount St. Helens, Washington, 1980 volcanic eruption: magmatic gas component during the first 16 days. *Science* 1980;28:1258-9.

Eruption of Mount St. Helens: Seismology, Geophysics Program, University of Washington. *Nature* 1980;285:529-31.

Kerr RA. Mount St. Helens: an unpredictable foe. *Science* 1980;28:1446-8.

### CDC Mount St. Helens Volcano Health Reports

The CDC Mount St. Helens Volcano Health Report will until further notice be published once a week. Information in these reports represents the latest data reported to CDC; much of the information is preliminary in nature and subject to confirmation and change. It is distributed for the purpose of providing up-to-date health data from CDC and the many other groups involved in public health assessment. We hope to continue to receive relevant reports and data from others working on this problem.

Henry Falk, M.D., Peter J. Baxter, M.D., Roy Ing, M.D., Jean French, Ph.D., Gary F. Stein, M.D., Chronic Diseases Division, Clark W. Heath, Jr., M.D., Director, Chronic Diseases Division, Bureau of Epidemiology, CDC, Atlanta, Georgia. James A. Merchant, M.D., Director, Division of Respiratory Disease Studies, NIOSH, CDC, Morgantown, West Virginia.

Special Contributions: Charles Phillips, Environmental Protection Agency, Las Vegas Laboratory; John Koranda, Ph.D., Lawrence Livermore Laboratory, University of California; and Calvin Frederick, M.D., National Institute of Mental Health, Rockville, Maryland.

