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DEPARTMENT OF HEALTH AND HUMAN SERVICES

PUBLIC HEALTH SERVICE
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CDC--MOUNT ST. HELENS VOLCANO HEALTH REPORT #3

June 3, 1980

Surveillance of hospital admissions

The same hospitals included in the CDC emergency room surveillance network in affected portions of Washington, Idaho, Montana, and Oregon (CDC Volcano Reports #1 & #2, May 30 and June 2, 1980) are monitored for hospital admissions. Three hospitals in the Moses Lake area (including Moses Lake, Othello, and Ritzville), 6 in the remainder of Washington, and 5 in Idaho, have reported the number of admissions for the period May 11-16, 1980 (Table 1).

In the Moses Lake area, where the volcanic ash fallout has been the heaviest, a 5.5% increase in admissions was reported for the week May 18-24, after the first volcanic eruption, as compared with the previous week (Table 2). For the same time period, however, the hospitals in Idaho and other parts of Washington reported admissions to be lower by 21.3% and 17.0%, respectively. This drop in admissions following the initial eruption might have been due to postponement of elective hospitalizations. Residents were advised not to travel because of hazardous road conditions created by the volcanic ash. We are now investigating whether there were increases in emergency hospitalizations, especially for cardiac or respiratory conditions.

Table 1. Daily hospital admissions for the Moses Lake Area in Washington, and the States of Washington and Idaho, May 11-26, 1980.

Day of Week	Date	Moses Lake, Othello, Ritzville WA	Washington (other)	Idaho
Sunday	May 11	10	162	47
Monday	12	21	266	87
Tuesday	13	13	266	57
Wednesday	14	20	243	56
Thursday	15	13	213	50
Friday	16	21	173	44
Saturday	17	12	103	40
Sunday	18*	22	141	33
Monday	19	16	138	35
Tuesday	20	15	173	35
Wednesday	21	18	221	56
Thursday	22	15	226	69
Friday	23	20	179	52
Saturday	24	10	105	20
Sunday	25†	11	103	41
Monday	26	11	191	47

*First volcanic eruption

†Second volcanic eruption

Table 2. Percent change in hospital admissions between the weeks of May 11-17 and May 18-24, 1980.

Week	Moses Lake Area	Washington (other)	Idaho
May 11-17	110	1,426	381
18-24	116	1,183	300
Percent change	+5.5%	-17.0%	-21.3%

Total Suspended Particulate Measurements

Ten air monitoring stations have been established by the Environmental Protection Agency (EPA) Region X. The stations include Spokane, Tri-City, Yakima, Longview, Olympia, and Seattle in Washington; Lewiston, Kellogg, and Coeur d'Alene in Idaho; and Portland, Oregon. After the first eruption on May 18, 1980, Yakima, Spokane, and Coeur d'Alene recorded the highest levels of total suspended particulates (TSP). The level of TSP peaked in Spokane and Coeur d'Alene on May 19, 1980, the day after the initial eruptions (Table 3). As late as May 23, 1980, Yakima had TSP measurements exceeding 10,000 ug/m³.
 Table 3. Peak Levels of Total Suspended Particulates (TSP) in Yakima, Spokane, and Coeur d'Alene Following the First Volcanic Eruption on May 18, 1980.

<u>Station</u>	<u>May 18, 1980</u>		<u>May 19, 1980</u>	
	<u>TSP ug/m³</u>	<u>Time frame</u>	<u>TSP ug/m³</u>	<u>Time frame</u>
Yakima	35,621	(1200-1600)	13,860	(1300-1700)
Spokane	17,579	(1200-1400)	35,613	(0000-1000)
Coeur d'Alene	15,345	(1600-1030)	35,809	(1030-1530)

Following the second eruption on May 25, 1980, the other communities of Kellogg, Lewiston, Olympia, and Tri-Cities all had TSP levels exceeding the EPA emergency level. (EPA ambient air quality standard for 24 hour average: primary--260 ug/m³; alert--375 ug/m³; warning 625 ug/m³; emergency--875 ug/m³; and significant harm--1000 ug/m³. The EPA air pollution standards are set for industrial particulate emissions usually associated with SO₂, NO₂ and other pollutants. To assess the potential health effects due to volcanic ash fallout it is necessary to determine both the chemical composition and the size distribution of the suspended particulates.)

Preliminary Results--Free silica analyses and health risks

Crystalline silica, or free silica, is defined as silicon dioxide (SiO₂). "Crystalline" refers to the orientation of SiO₂ molecules in a fixed pattern as opposed to a nonperiodic, random molecular arrangement defined as amorphous. The 3 most common crystalline forms of free silica encountered in industry are quartz, tridymite, and cristobalite. Exposure to free silica, particularly the latter 2 forms, are related to the development of the industrial disease, silicosis. (Criteria for a Recommended Standard . . . Occupational Exposure to Crystalline Silica. National Institute for Occupational Safety and Health, 1974. HEW Publication No. (NIOSH) 75-120).

As reported previously, the major components of the ash appear to be silicon-containing materials and aluminum and other oxides. First analyses have been completed at NIOSH laboratories in Cincinnati of 4 settled dust samples collected in Washington State. The samples were analyzed qualitatively by X-ray fluorescence spectrometry and quantitatively by plasma emission spectroscopy (ICPAES). Major elements found included: Al, Ca, Fe, Na, K, Si, and Ti. The large number of silicate minerals in the volcanic ash has made the identification of cristobalite difficult. The identification of cristobalite was attempted by X-ray diffraction, infrared spectroscopy, thermal analysis, Talvitic gravimetric, and light and electron microscopy. Cristobalite has been confirmed by the presence of the 3 major diffraction peaks in the <10um fraction. The

amount of cristobalite found was 4%-6%. No fibrous material has been found in any of the samples.

These results on bulk samples are preliminary in nature. Respirable bulk air samples need to be taken. Two hundred fifty samplers have been sent out this week with the NIOSH industrial hygiene team (see below).

In order to assess the health effects in workers exposed to volcanic ash in Washington State, NIOSH sent 4 industrial hygienists to the state to measure the personal dust exposures of municipal workers. Preliminary results from these studies will be known in 2 weeks. This will serve as a basis for an intensive medical and environmental study which is being planned for workers of the logging industry in the areas affected by volcanic ash.

With the preliminary best estimate for the proportion of crystalline silica in the volcanic ash of 4%-6%, workers who breathe fine particles of this ash for several months may have a potential for the development of silicosis. The above studies are therefore directed at industrial groups with high exposure potential to assess the possible health effects of such exposure. The use of protective respiratory equipment and dust control measures for workers needs to be continued.

At this estimate for the proportion of crystalline silica in the ash, it is not thought that there will be a risk of silicosis for the general population. However, given the very high levels of total suspended particulates in air, uncertainty about future activity of the volcano and persistence of the ash, and the preliminary nature of these results, CDC will continue to expand surveillance efforts in the population as previously outlined.