

DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
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ATLANTA, GEORGIA 30333

CDC--MOUNT ST. HELENS VOLCANO HEALTH REPORT #12

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Potential Flooding

As a result of the 3 eruptions of Mount St. Helens, mud, silt, ash, and trees have accumulated in nearby rivers and streams limiting their water-flow capacity. This poses the threat of flooding in those areas if heavy rainfall occurs before the rivers can be properly cleared and dredged. The areas of greatest concern are the town of Castle Rock, Washington, and the section where the Cowlitz River joins the Toutle River. The Army Corps of Engineers is building levees and dikes as well as dredging critical sections of the rivers in an attempt to limit the threat of flooding.

Sewage Treatment Systems

Several communities that received heavy ashfall from the initial eruption of Mount St. Helens continue to have problems with their sewage treatment systems. The sewage treatment plant in Moses Lake, Washington, is still not in operation, and raw sewage is being pumped into a lagoon where the effluent is heavily chlorinated. The sewage treatment plants in Yakima and Spokane, Washington, have only primary treatment capability at present, but secondary treatment should soon be resumed. Thus far, no adverse health effects have been reported in association with the sewage treatment problems in these communities, but close surveillance is warranted.

Hospital Surveillance Follow-Up

Hospital surveillance data, as reported in previous issues of this report, have demonstrated transient increases in emergency room (ER) visits and hospital admissions for pulmonary problems in areas of heavy ashfall, particularly in eastern Washington. Follow-up studies are being conducted to determine 1) the severity of these illnesses and 2) the risk factors associated with the increased number of ER visits and hospital admissions. All ER and hospital admissions records for pulmonary conditions at the 2 Yakima hospitals in the surveillance system are being reviewed and analyzed for the 2 weeks before and after the May 18 eruption to determine duration, severity, and treatment of illness. A case-control study is being undertaken to determine the role of a variety of factors (pre-existing pulmonary disease, time spent outdoors, use of protective respiratory equipment, and others) bearing on the apparent increase in the numbers of cases of pulmonary disease.

NIOSH Environmental Sampling for Exposure to Airborne Ash in Six Communities

Between June 3 and 13, NIOSH industrial hygienists collected personal and area samples in 5 Washington State communities (Longview, Chehalis, Moses Lake, Yakima, and Spokane) and Northern Idaho that were subjected to ash from either the May 18 or 25 Mount St. Helens eruptions. The objective of this survey was to assess occupational exposures and also to assess some community breathing-zone concentrations of respirable dust. These samples cannot be equated with EPA samples, which are collected with different instruments and at different locations.

Samples of ash taken from these areas were analyzed by the NIOSH laboratories. The particles of these samples that were of respirable size (10 microns or less) have consistently been found to contain approximately 6% free crystalline silica (SiO_2) of which 2% is quartz and 4% is cristobalite. The sampling method consisted of using a personal sampling pump at a flow rate of

1.7 lpm with respirable dust particles collected on a 37-mm PVC filter after passing through a 10-mm cyclone.

The NIOSH-recommended criterion for occupational exposure is 50 μg of free SiO_2 in the respirable dust per cubic meter of air (50 $\mu\text{g}/\text{cu m}$). Respirable dust concentrations of 0.8 to 1.0 $\text{mg}/\text{cu m}$ of air and a 5% to 6% free SiO_2 content will yield approximately 50 μg free $\text{SiO}_2/\text{cu m}$.

Based upon available epidemiologic data, nearly all occupationally exposed workers could be exposed up to this concentration 8 hours a day, 5 days a week, for many years without being expected to develop silicosis.

The following list shows the occupations and the average respirable dose concentrations from all locations.

| Job | Average Concentration Respirable Dust $\text{mg}/\text{cu m}$ |
|--------------------------------------|---|
| Clean-up Crews | |
| hand-shoveling and sweeping | 0.46 |
| sweeper truck or broom truck drivers | 0.64 |
| Front end loader operators | 0.50 |
| grader operators | 0.56 |
| water truck drivers | 0.21 |
| truck drivers | 0.19 |
| manual hosing | 0.05 |
| Rubbish worker | 0.67 |
| Idaho forest worker | 0.48 |
| Agricultural worker | 0.55 |
| Law Enforcement Personnel | 0.10 |
| Area Samples | |
| homes | 0.03 |
| schools | 0.06 |
| commercial establishments | 0.09 |
| autos | 0.10 |

Eighty-five percent of the samples that had respirable dust concentrations of 0.8 $\text{mg}/\text{cu m}$ (800 μg) or more were collected in the Moses Lake and Yakima areas. Those occupations that had an average respirable dust concentration of 0.45 $\text{mg}/\text{cu m}$ or more exceeded 0.8 $\text{mg}/\text{cu m}$ 15% to 31% of the time.

During the sampling period the clean-up crews (with the exception of the water truck drivers and truck drivers), rubbish workers, and forest workers were exposed to concentrations of respirable dust that exceeded 0.8 $\text{mg}/\text{cu m}$ 15% to 31% of the time. The use of respirators or dust masks by these individuals would reduce the amount of dust being inhaled. Area samples suggest the general population is exposed to low concentrations of respirable dust particles in the homes, school buildings, commercial establishments, and also in cars with the windows up. They could, however, be subjected to high concentrations of both total and respirable dust while doing hand clean-up work outside the house or when high winds are creating visible amounts of ash in the air.

Conclusions

1. During this period of sampling some clean-up workers, rubbish workers and forest workers were exposed to excessive respirable dust levels based on a free silica content of 5%-6%. Should there be further ashfall or sustained work in heavy ashfall which result in similar and prolonged exposures over a period of several years, these workers would be expected to be at increased risk from silicosis.

2. The very low levels of respirable dust measured in community settings, if representative of any future ashfalls, suggest the general population is not likely to be at increased risk to silicosis. Individuals with asthma and chronic lung disease may have their conditions aggravated by high levels of respirable dust.

Recommendations

1. Occupationally exposed workers involved in operations that create a visible dust cloud or when the airborne dust is visible should wear NIOSH-approved half face respirators with changeable filters or a single-use dust mask.

2. General Public:

- a. During future ashfalls individuals should stay indoors, if in a car keep the windows closed, and wear a NIOSH-approved single-use dust mask. If dust masks are not available (dust masks do not fit children) wet a handkerchief and fit over the nose and mouth.
- b. After the ashfall and until clean up is accomplished one should spend as much time as possible indoors. When doing hand clean up, wear a dust mask. When driving, keep windows of cars closed.

CDC--Mount St. Helens Volcano Health Reports are now being issued on a twice-a-week basis (Tuesdays and Fridays). 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.

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TABLE 1
RESPIRABLE AND TOTAL DUST SAMPLE RESULTS
FOR PERSONS EXPOSED TO AIRBORNE VOLCANIC ASH
June 2-13, 1980

| Job or Area | | \bar{X} ¹ mg/cu m | M ² mg/cu m | Range ³ mg/cu m | N ⁴ | Respirable Samples >0.8 mg/cu m |
|---|------------------|-----------------------------------|---------------------------|-------------------------------|----------------|---------------------------------------|
| Hosing | (R) ⁶ | 0.05 | 0.06 | 0.03-0.06 | 3 | |
| Water Truck Drivers | (R) | 0.21 | 0.17 | 0.04-0.64 | 17 | |
| | (T) ⁷ | 1.48 | 0.83 | 0.23-6.14 | 10 | |
| Front end loader operators | (R) | 0.50 | 0.47 | 0.21-0.96 | 5 | 1 |
| | (T) | | | 6.17-63.6 | 2 | |
| Sweeper truck or broom truck drivers | (R) | 0.64 | 0.48 | 0.03-2.83 | 21 | 6 |
| | (T) | 5.5 | 1.5 | 0.06-23.1 | 8 | |
| Hand shoveling & sweeping | (R) | 0.46 | 0.29 | 0.02-2.08 | 19 | 4 |
| | (T) | 2.65 | 1.8 | 0.64-6.46 | 4 | |
| Grader operators | (R) | 0.56 | 0.23 | 0.01-2.33 | 13 | 2 |
| | (T) | 5.96 | 0.7 | 0.01-31.9 | 6 | |
| Flagman | (R) | | | 0.04-0.78 | 2 | |
| | (T) | | | 0.91 | 1 | |
| Surveyor | (R) | | | 0.19 | 1 | |
| Foreman | (R) | | | 0.21-0.26 | 2 | |
| | (T) | | | | | |
| Truck Drivers | (R) | 0.19 | 0.14 | 0.10-0.37 | 8 | |
| | (T) | | | 0.47-0.73 | 2 | |
| Rubbish Collector | (R) | 0.67 | 0.28 | 0.11-5.51 | 17 | 4 |
| | (T) | 9.01 | 4.38 | 0.73-25.5 | 5 | |
| Private Residence | (R) | 0.03 | 0.04 | 0.01-0.08 | 15 | |
| | (T) | 0.09 | 0.65 | 0.03-0.2 | 12 | |
| Schools | (R) | 0.06 | 0.09 | 0.01-0.11 | 4 | |
| | (T) | 0.30 | 0.25 | 0.20-0.5 | 4 | |
| Commercial establishments | (R) | 0.09 | 0.07 | 0.03-0.2 | 5 | |
| | (T) | 0.30 | 0.39 | 0.11-0.44 | 5 | |
| Roads | (R) | | | 0.01-0.07 | 3 | |
| | (T) | | | 0.01-0.38 | 3 | |
| Agricultural workers | (R) | 0.44 | 0.36 | 0.01-1.39 | 9 | 1 |
| | (T) | 1.42 | 0.77 | 0.79-3.2 | 3 | |
| Gas station attendants | (R) | 0.04 | 0.05 | 0.02-0.06 | 3 | |
| | (T) | | | 0.51 | 1 | |
| Power lawn mower | (R) | | | 3.84 | 1 | 1 |
| | (T) | | | 50.8 | 1 | |
| Idaho Forest | (R) | 0.48 | 0.49 | 0.01-2.46 | 9 | 2 |
| Police | (R) | 0.10 | 0.07 | 0.01-0.23 | 25 | |
| | (T) | 0.57 | 0.19 | 0.04-4.17 | 17 | |
| Miscellaneous | (R) | 0.33 | 0.2 | 0.02-1.11 | 9 | 2 |
| | (T) | 2.13 | 1.26 | 0.17-4.28 | 4 | |
| Motor Pool | (R) | | | 0.01 | 2 | |
| Gas Station (Area) | (R) | | | 0.2 | 1 | |
| | (T) | | | 0.42 | 1 | |

1. \bar{X} - mean or average sample value.
2. M - median sample value.
3. Range - range sample values.
4. N - the number of sample values.
5. mg/cu m - milligrams per cubic meter.
6. R - respirable dust.
7. T - total dust.

TABLE 2
SUMMARY OF RESPIRABLE AND TOTAL DUST SAMPLE RESULTS
FOR PERSONS EXPOSED TO AIRBORNE VOLCANIC ASH BY CITY
June 2-13, 1980

| Job or Area | | Composite \bar{X}^1 | Chehalis \bar{X} | Longview \bar{X} | Yakima \bar{X} | Spokane \bar{X} | Moses Lake \bar{X} |
|----------------------------|-----|--------------------------|-----------------------|-----------------------|---------------------|----------------------|-------------------------|
| Hosing | (R) | 0.05 | 0.05 | | | | |
| Water Truck Drivers | (R) | 0.21 | 0.25 | 0.22 | 0.14 | 0.08 | 0.39 |
| | (T) | 1.48 | 1.6 | 0.55 | 0.93 | | 3.5 |
| Front end loader operators | (R) | 0.50 | 0.21* | | | 0.57* | 0.57 |
| | (T) | | | | | 63.6* | 6.17* |
| Sweeper truck or broom | (R) | 0.64 | 0.64 | 0.6 | 0.83 | | |
| truck drivers | (T) | 5.5 | 4.4 | 11.58 | | 1.5 | |
| Hand shoveling & sweeping | (R) | 0.46 | 0.2 | 1.0 | 0.52 | 0.27 | 0.25 |
| | (T) | 2.65 | | 6.46* | | 0.64* | 1.8 |
| Grader operators | (R) | 0.56 | 0.25 | 0.13 | 0.16* | | 0.83 |
| | (T) | 5.96 | 0.71 | 0.47 | 60.01* | 33.7 | |
| Flagman | (R) | | 0.04* | 0.28* | | | |
| | (T) | | 0.91* | | | | |
| Surveyor | (R) | | 0.19* | | | | |
| Foreman | (R) | | | | | | 0.24 |
| | (T) | | | | | | |
| Truck Drivers | (R) | 0.19 | | 0.1* | | 0.14 | 0.36 |
| | (T) | | | 0.47* | | 0.73* | |
| Rubbish Collector | (R) | 0.67 | | | | 0.35 | 3.2 |
| | (T) | 9.01 | | | | 5.0 | 14.9 |
| Private Residence | (R) | 0.03 | 0.03 | 0.01 | | 0.03* | 0.04 |
| | (T) | 1.0 | 0.08 | 0.05 | | 0.07* | |
| Schools | (R) | 0.06 | | 0.10 | | | 0.02 |
| | (T) | 0.30 | | 0.24 | | | 0.36 |
| Commercial establishments | (R) | 0.09 | 0.04 | | | | 0.123 |
| | (T) | 0.30 | 0.19 | | | | 0.42 |
| Roads | (R) | | 0.01* | 0.04 | | | |
| | (T) | | 0.01* | 0.3 | | | |
| Agricultural workers | (R) | 0.55 | | | 0.56 | | 0.26 |
| | (T) | | | | 1.98 | | 0.29* |
| Gas station attendants | (R) | 0.04 | 0.04 | | | | |
| | (T) | | 0.51* | | | | |
| Power lawn mower | (R) | | | | | | 3.84* |
| | (T) | | | | | | 50.85* |
| Idaho Forest | (R) | 0.48 | NORTHERN ID. | (0.67) | | | |
| Police | (R) | 0.10 | 0.13 | 0.04 | | 0.1 | 0.07 |
| | (T) | 0.57 | 0.9 | 0.1 | | 0.2* | 0.625 |
| Miscellaneous | (R) | 0.33 | 0.06 | 0.54 | | | |
| | (T) | 2.1 | 0.17* | 2.8 | | | |
| Motor Pool | (R) | | 0.01* | | | | |
| Gas Station (Area) | (R) | | | | | | |
| | (T) | | | | | | |

*1 sample.

1. \bar{X} - mean or average sample value.

