

Data documentation for size and shape characteristics of airborne amphibole asbestos and amphibole cleavage fragments

Title
Size and shape characteristics of airborne amphibole asbestos and amphibole cleavage fragments

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Data Files

The xlsx files may contain multiple studies on separate sheets. Please see the abstracts in this document for an explanation of the various studies.

The csv versions contain the same data as the corresponding xlsx file, but their structure has been modified to make well-formed csv. Where there are multiple studies for a particular site, the studies have been divided into separate csv files. The csv files are provided as a software-independent alternative to the xlsx format.

Grunerite, South Dakota	1. wylie_airborne_grunerite_sd_study1-2.xlsx 2. wylie_airborne_grunerite_sd_study1.csv 3. wylie_airborne_grunerite_sd_study2.csv
Actinolite, Virginia	4. wylie_airborne_actinolite_va.xlsx 5. wylie_airborne_actinolite_va.csv
Grunerite and Actinolite, Minnesota	6. wylie_airborne_grunerite_actinolite_mn_study1-2-3.xlsx 7. wylie_airborne_grunerite_actinolite_mn_study1.csv 8. wylie_airborne_grunerite_actinolite_mn_study2.csv 9. wylie_airborne_grunerite_actinolite_mn_study3.csv

Amosite, Shipyard & Electrical Company	10. wylie_airborne_amosite_shipyard_electric.xlsx 11. wylie_airborne_amosite_shipyard.csv 12. wylie_airborne_amosite_electric.csv
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Temporal Extent
Data collected ca. 1977-1979

Spatial Extent
Air-monitoring filters obtained from: <ol style="list-style-type: none"> 1. Homestake Gold Mine, Lead, South Dakota. 2. Shadwell Quarry, Charlottesville Stone Quarry, Virginia. 3. Peter Mitchell Iron Ore Mine, Mesabi Range, Minnesota. 4. Shipyard (unidentified) 5. Electrical Company (unidentified)

Abstracts	
Grunerite, South Dakota	<p>Air-monitoring filters from the Homestake Gold Mine, Lead, South Dakota were sent by Diann Kraft and Glen Sutton of the US Mine, Safety and Health Administration to the US Bureau of Mines in about 1977. The data generated in this study came from three different filters. The University of Maryland and the Bureau of Mines collaborated in the analysis of these air filters. Data from this analysis are divided into two studies.</p> <p>Analysis of the original occupational filters followed a protocol of counting every particle that appeared to be amphibole. These analyses were not used in publication. They are included in this file and labeled as Study 1. Measurements are grouped by aspect ratio, divided into those with a ratio of at least 2:1 and those with a ratio less than 2:1.</p> <p>The initial measurements (Study 1) were made difficult by the textured filter that had been used to collect the material. Therefore, portions of each filter were ashed (low temperature), the residue suspended in water, agitated by ultrasound, and filtered onto 0.1 µm Nucleopore filters (Study 2).</p> <p>The filters were recounted after ashing and re-suspension, and only particles that had an aspect ratio (length/width) of 2:1 and could be</p>

	<p>identified as grunerite from their chemical spectrum were measured. These data are labeled as Study 2.</p> <p>In both studies, a portion of each filter was placed on an SEM stub and carbon coated. Latex spheres of 1.009 μm were added to provide scale. Precision is estimated as +/- 0.05. Samples were examined by Scanning Electron Microscopy (SEM) with Energy-Dispersive X-Ray Analysis (EDXA) capability. All particles whose measurements are included in this data set had straight parallel sides and were identified as grunerite based on qualitative chemical analysis.</p>
<p>Actinolite, Virginia</p>	<p>Air-monitoring filters from the Shadwell Quarry, Virginia, were sent by Diann Kraft and Glen Sutton of the US Mine, Safety and Health Administration to the US Bureau of Mines in about 1977. The data contained in this file came from seven different filters. The University of Maryland and the Bureau of Mines collaborated in the analysis of these air filters.</p> <p>The initial measurements were made difficult by the textured filter that had been used to collect the material. Therefore, portions of each filter were ashed (low temperature), the residue suspended in water, agitated by ultrasound, and filtered onto 0.1 Nucleopore filters. All data in this file was collected from the Nucleopore filters.</p> <p>A portion of each filter was placed on an SEM stub and carbon coated. Latex spheres of 1.099 μm were added to provide scale. Filters were scanned at 8000X measured at 16,000X. All measurements are in micrometers (μm). Precision is estimated as +/- 0.05 μm.</p> <p>Samples were examined by SEM with EDXA capability. All particles whose measurements are included in this data set had straight parallel sides, a chemical composition consistent with actinolite, and a length to width ratio (aspect ratio) of at least 2:1. The data set also differentiates those particles with an aspect ratio of 3:1 or greater.</p> <p>In the publications listed elsewhere in this document, the number of particles in the data set is reported as 605. The data set in this file contains data on 609 particles. The laboratory notes do not explain how these two sets differ. It is most likely that in preparation for publication, some particles of perhaps questionable chemical composition were eliminated.</p>

<p>Grunerite and Actinolite, Minnesota</p>	<p>Air-monitoring filters from the Peter Mitchell Iron Ore Mine, Mesabi Range, Minnesota, were sent by Diann Kraft and Glen Sutton of the US Mine, Safety and Health Administration to the US Bureau of Mines in about 1977. The data contained in this file came from five different filters. The University of Maryland and the Bureau of Mines collaborated in the analysis of these air filters. Data from this analysis are divided into three studies.</p> <p>In Study 1, analyses were of the as-received occupational filters and followed a protocol of counting every particle that met the criteria for amphibole. These analyses from Study 1 were not used in publication.</p> <p>The initial measurements (Study 1) were made difficult by the textured filter that had been used to collect the samples. Therefore, portions of each filter were ashed (low temperature), the residue suspended in water, agitated by ultrasound, and filtered onto 0.1 μm Nucleopore filters (Study 2).</p> <p>Portions of each filter were recounted after ashing and re-suspension, and only grunerite particles that had an aspect ratio (length/width) of 2:1 were measured. These data are labeled as Study 2. Unfortunately, in the data set Study 2 is an incomplete file.</p> <p>The original filters were also examined by optical microscopy and the lengths and widths of all particles with straight parallel sides, a 2:1 aspect ratio, and lengths greater than 2 μm were included in the measurements. They are included in this data set as Study 3.</p> <p>In studies 1 and 2, a portion of each filter was placed on an SEM stub and carbon coated. Latex spheres of 1.009 μm were added to provide scale. Precision is estimated as $\pm 0.05 \mu\text{m}$. Samples were examined by SEM with EDXA capability. All particles whose measurements are included in this data set had straight parallel sides and were identified as grunerite or actinolite based on qualitative chemical analysis by EDXA.</p> <p>Analyses of the Study 2 data are presented in publications listed elsewhere in this document. In these publications, the number of amphibole particles in the data set is reported as 464 particles that have an aspect ratio of at least 2:1. Study 2 file contains only 42 particles. The rest of the data set has been lost.</p> <p>The data from Study 1 have not been published. However, they</p>
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	<p>were derived from the same air filters as those reported in the two publications, the same criteria for mineral identification were applied, and the measurements were made with the same precision. There are almost 1000 individual amphibole particle measurements in this data set, with approximately 25% attaining a 2:1 aspect ratio. This data set is a reliable reference for airborne amphibole particle dimensions in the Peter Mitchell Pit at this time.</p>
<p>Amosite, Shipyard and Electrical Company</p>	<p>Air monitoring filters from two locations where Amosite was being used were sent to the US Bureau of Mines in November of 1979 by Willard Dixon at the US Occupational Safety and Health Administration. There were 14 filters from the Shipyard and two filters from the Electrical Company that were analyzed. The University of Maryland and the Bureau of Mines collaborated in the analysis of these air filters.</p> <p>Amosite is a commercial name for asbestos from the Transvaal region of South Africa that is composed primarily of the asbestiform variety of the mineral grunerite but which may also contain asbestiform actinolite.</p> <p>A portion of each filter was placed on an SEM stub and carbon coated. Latex spheres of 1.099 μm were added to provide scale. Filters were scanned at 8000X measured at 16,000X. All measurements are in micrometers (μm). Precision is estimated as $\pm 0.05 \mu\text{m}$.</p> <p>Samples were examined by SEM with EDXA capability. All particles whose measurements are included in this data set had straight parallel sides, a chemical composition consistent with grunerite (primarily) or actinolite, and a length to width ratio (aspect ratio) of 3:1. In the attached xlsx file, the data for the Shipyard and Electric Company are reported separately. The data have been sorted by length.</p> <p>In the associated publications listed elsewhere in this document, the numbers of particles in the data sets are reported as 698 from the Shipyard and 285 from the Electrical Company. The data sets in this file contain data 839 amosite particles from the Shipyard and 375 amosite particles from the Electrical Company. Measurements from filter 9161A from the Shipyard were not included in the publications, accounting for 15 particles in this data set not reported in the</p>

	<p>publications for the Shipyard. A master sheet that lists the number of amosite particles identified and measured from each filter is in agreement (± 1) with the number of particle measurements included in this data set for each filter with the exception of filters 9156A from the Shipyard and 9172A from the Electrical company. The Master sheet lists 196 Amosite particles measured from filter 9156A while this data set contains only 171. For filter 9172A, 298 amosite particles are listed on the Master sheet vs 305 included in this data set. The laboratory notes do not explain these discrepancies.</p>
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<p>Instruments</p>
<ol style="list-style-type: none"> 1. Scanning Electron Microscopy (SEM) with Energy-Dispersive X-Ray Analysis (EDXA) capability. 2. Optical Microscopy (Grunerite and Actinolite, Minnesota, Study 3 only).

<p>Variables/Parameters</p>	
<p>Not all data files contain all parameters. See the abstracts elsewhere in this document for additional information.</p>	
<p>Particle aspect ratio</p>	<p>length:width</p>
<p>Air filter</p>	<p>numerical identifier for air-monitoring filters</p>
<p>Length</p>	<p>particle length in micrometers - μm</p>
<p>Width</p>	<p>particle width in micrometers - μm</p>

<p>Keywords/Topics</p>
<p>Actinolite Amosite Grunerite Asbestos Amphibole group Mineral industries - health aspects Shipbuilding industry - health aspects Electric power production - health aspects Industrial hygiene Granulometry</p>

Associated Publications

Analyses of South Dakota study 2 data, Virginia, Minnesota study 2, shipyard and electric company data are presented in the following publications:

Virta, R.L., Shedd, K.B., Wylie, A.G. and Snyder, J.G., 1983, Size and shape characteristics of amphibole asbestos and amphibole cleavage fragments collected on occupational air monitoring filters, *in* Marple, V.A., and Liu, B.H., ed., *Aerosols in the Mining and Industrial Work Environments Volume 2: Characterization*, Ann Arbor Science, p. 633-643.

Wylie, A.G., Virta R., and Russek, E., 1985, Characterizing and discriminating airborne amphibole cleavage fragments and amosite fibers: Implications for the NIOSH method: *American Industrial Hygiene Association Journal*, v. 46, p. 197-201.

<http://dx.doi.org/10.1080/15298668591394653>

Data Citation

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Data Repository

Digital Repository at the University of Maryland (DRUM)

<http://drum.lib.umd.edu>

drum-help@umd.edu

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Availability

Open Access