

Data Summary and Findings

Vermont Asbestos Group Mine

October, 2008 sampling

Eden/Lowell, VT

What is the purpose of this document?	<p>At the request of the USEPA, ATSDR has reviewed the data set from the US EPA's sampling event in October 2008 at the Vermont Asbestos Group (VAG) Mine, in Eden and Lowell, VT. The purpose of this document is the following:</p> <ul style="list-style-type: none">• help describe the collected data,• present a summary of the findings, and• provide context for this site-specific data
What does this document not address?	<p>This document does not provide data or other information regarding the presence of asbestos outside of the mine property, with the exception of an adjoining property. The document does not attempt to quantify the risk associated with asbestos exposure at the mine. It should also be noted that this data represents a one-time sampling effort.</p>
Background	<p>Chrysotile asbestos was mined on Belvidere Mountain in the northern part of Vermont from the early 1900s to 1993. The mining process recovered chrysotile asbestos ("white asbestos") leaving behind large quantities of waste rock and tailings from this process. Asbestos is still found at the mine in various forms, including undisturbed veins of the raw mineral in the quarry walls and several million cubic yards of processed rock. Erosion of the tailing piles by water impacts downstream waters and wetlands.</p> <p>By 1929 the mine was producing almost all of the asbestos in the United States. In the 1960s, an estimated 3,500 tons of ore were mined daily. By the late 1970s, the mine was reportedly producing approximately 30,000 to 35,000 tons of fiber per year. Later, in 1985, the VAG mine was one of three asbestos-producing mines in the US, with a processing rate of approximately 150 to 200 tons per hour. The ore was mined from an open pit in 50-foot levels. Ore was trucked from the mine pit to the crusher. Once through the primary crusher, the ore was trucked to a processing plant where it was further milled to approximately 3/4-inch diameter and then dried in a rotary kiln. After drying, the material was crushed again to facilitate separation of asbestos fibers from the host rock. Asbestos fibers were then collected by vacuum and bagged for shipment offsite as products. Following the asbestos recovery process, the remaining milled tailing was disposed of onsite.</p>

	<p>Investigations related to the VAG mine have been ongoing since 2004, focusing on the downstream impacts from water eroding the tailing piles. Starting in 2007, EPA installed interim water erosion control measures to limit tailing movement into downstream waters and wetlands. This effort was completed in 2008.</p> <p>In October 2008 EPA led a sampling effort at the VAG mine site and an adjacent property. The focus of the tests was to further characterize asbestos found on-site and on the neighboring property, and to determine to what extent the asbestos could become airborne. This document is being released along with the data report for the October sampling.</p>
<p>Why was testing performed?</p>	<p>The testing was performed to provide information to support the bankruptcy claim made by EPA and the state of Vermont in October 2009 against a former mine owner. Specifically, the testing was designed to document the presence of asbestos and determine potential asbestos exposure at an on-site residence, an off-site adjoining seasonal residence, and to trespassers known to use the site for all-terrain vehicle (ATV) riding. The sampling was performed in accordance with the most recent EPA guidance for asbestos sampling. The goal of the sampling methods is to disturb the surface material to determine whether asbestos is released into the air and could be inhaled by individuals. The sampling also included soil, dust and bulk (building material) samples that may be sources that could contribute to ambient airborne asbestos.</p> <p>The sampling was not intended to be a comprehensive program that would allow for a site-specific risk assessment. The sampling results were, however, expected to be made available to the site project team to provide a better understanding of the site and help with the scoping of future investigation programs, if appropriate.</p>
<p>Why the concern over asbestos?</p>	<p>It is well known that breathing in asbestos fibers can lead to adverse health effects and even death. The types of adverse health effects are mostly diseases of the lungs, but the larynx and peritoneum (membrane lining the abdominal and pelvic wall) can also be affected. The diseases that are most linked to airborne asbestos exposure include asbestosis, pleural (the membrane covering the lungs and lining the chest cavity) changes, lung cancer, and a cancer known as mesothelioma. More information about these diseases can be found on the ATSDR website: (http://www.atsdr.cdc.gov/asbestos/asbestos/health_effects/)</p>
<p>What testing was performed?</p>	<p>Soil, air and dust were sampled. Air sampling included activity-based sampling which is used to determine whether asbestos fibers in soil or solid materials can be released to the breathing zone by a specific activity. For this site, sweeping was chosen for indoor activity-based sampling and raking was chosen for outdoor activity-based sampling along with ATV</p>

	<p>riding.</p> <p>The primary testing consisted of:</p> <ul style="list-style-type: none"> • Soil sampling • Microvac dust sampling (sampling indoor dust using a small vacuum pump with a filter attached to the pump) • Activity-based sampling <ul style="list-style-type: none"> ○ Indoor sweeping of onsite residence and a cabin located adjacent to a wetland filled with asbestos tailing ○ Raking adjacent to residences ○ ATV riding on site, including the old (upper) tailing pile • Ambient outdoor air monitoring • Building Materials (also referred to as Bulk materials) • Meteorological monitoring <p>The nature of asbestos mixed with other substances (for example, dust) makes the laboratory analysis difficult. Three methods of analysis are used, each with its own advantages and disadvantages. Using the most advantageous methods, soil samples were analyzed by polarized light microscopy (PLM), and dust and air samples were analyzed using transmission electron microscopy (TEM). Unlike TEM, the third method, phase-contrast microscopy (PCM), does not distinguish between asbestos and non-asbestos fibers in these types of samples, so it was not used in this study. However, most epidemiology and toxicity studies to determine health effects of air-borne asbestos used PCM. To make the results comparable, TEM results, in units of structures per cubic centimeter (s/cc), were converted to be equivalent to PCM results (PCMe), in s/cc. Soil and bulk samples are reported as % asbestos. Dust samples are reported in units of structures per square centimeter of surface (s/cm²).</p>
<p>What did the tests find?</p>	<p>Asbestos fibers were detected in soil, dust, building material and air samples, and showed a potential for exposure to asbestos. Below is a brief summary of the results.</p> <p>Soil and Dust Samples</p> <p>Chrysotile asbestos was detected in 59 of the 66 soil samples. Chrysotile asbestos in the soil samples ranged from a trace to 55 percent. Chrysotile asbestos was found throughout the site including tailing piles, interior roads, and the building compound. Chrysotile asbestos was also found in soil samples on the neighboring property with the impacted wetland. The highest percentages (55 and 35 percent) were from surface soil samples collected from the main and secondary tailing piles, respectively.</p> <p>Ten indoor micro-vacuum dust samples were collected from the onsite residence and nearby cabin. Chrysotile asbestos was found in all the dust samples. The results ranged from approximately 60,000 to 4 million</p>

	<p>asbestos s/cm².</p> <p>Activity-Based Air Samples</p> <p>In the sixty-five air samples associated with activity-based sampling, the results varied widely, ranging from non-detect to 7.47 s/cc. Highest levels were generally found in the indoor activity-based samples.</p> <p>Results from the outdoor activity-based sampling were also variable, ranging from non-detect to 0.336 s/cc in PCMe. The highest level was found from ATV riding on the old (upper) tailing pile.</p> <p>Reference Ambient Outdoor Air Monitoring</p> <p>Ten reference ambient air monitoring samples were collected along North Road during the EPA's three-day sampling event. Asbestos was not detected in seven of the ten samples. The highest level detected was 0.000329 s/cc. Also, asbestos was not detected in any of the five outdoor ambient air samples that were collected on the VAG and neighboring property with the cabin. No activities that disturb the surface took place during the ambient air outdoor sampling.</p> <p>Details of all testing is included in the report, VERMONT ASBESTOS GROUP SITE, LOWELL/EDEN, VERMONT, WORK ASSIGNMENT #EAC00368, FINAL TRIP REPORT, July 14, 2009, which can be found at (http://www.epa.gov/region1/VAG)</p>
<p>Conclusions</p>	<p>This sampling effort found asbestos in soils, indoor dust, and bulk materials. Air sampling results, both indoors and outdoors, show that asbestos fibers present on-site are released into air during activities known to occur at the site.</p> <p>Soil and dust data can be used only to indicate a potential for release of asbestos fibers to the air. Soils that contain even less than 1% asbestos can release unacceptable concentrations of asbestos fibers (USEPA OSWER Directive 9345.4-05, August 10, 2004¹). It is implicit that similar soils that contain even greater amounts of asbestos have an increased potential of causing higher airborne levels. All the soil samples at the VAG Mine far exceed 1% asbestos. In addition, James R. Millette in his 1994 book, <i>Settled Dust Sampling and Analysis</i>, provides some guidance for dust. Dust values of greater than 100,000 f/cm² are "considered high and in the range of a significant accidental release". Indoor dust samples were as high as 4 million f/cm². This is an extremely high dust level. (See Note.).</p> <p>EPA provides risk-based concentrations of asbestos for residential exposure in the <i>Framework for Investigating Asbestos-Contaminated</i></p>

	<p><i>Superfund Sites</i>, EPA OSWER Directive 9200.0-68, September 2008¹. Exposure for 30 years to an asbestos level of 0.001 s/cc results in a risk of 1 in 10,000 excess cancer deaths (a value within EPA's acceptable risk range.) The airborne asbestos values from the October data set exceed this level with the exception of the reference ambient air samples.</p> <p>The Occupational Health and Safety Administration (OSHA) set asbestos exposure levels in the workplace. The agency's permissible exposure limit (PEL) for an 8-hour exposure over a 40 hour work week is 0.1 fibers per cubic centimeter (f/cc) (See Note.). The PEL provides some basis for comparison, but is not protective of human health in the community setting for several reasons. It leaves too high a risk in place (the risk exceeds EPA's guidelines for acceptable risk), it requires worker personal protective equipment to be available, it requires worker health monitoring, and it requires worker education along with smoking cessation programs. None of these programs are available for community members. Some of the air levels detected in the October sampling exceed the occupational limit. Some of the findings even show asbestos levels exceeding the OSHA short term exposure limit of 1 f/cc for 30 minutes.</p> <p>¹http://www.epa.gov/superfund/health/contaminants/asbestos/pdfs/framework_asbestos_guidance.pdf Note: For purposes of this investigation, f/cm² and f/cc are comparable to s/cm² and s/cc, respectively.</p>
<p>Recommendations</p>	<ul style="list-style-type: none"> • Restrict access to the VAG mine property. This includes taking steps to prohibit and discourage recreational use of the site. • Prevent the reuse of tailings and all other material from the VAG mine property for use beyond the VAG mine property. • Restrict access to the wetland located a mile downstream from the secondary pile in the Hutchins Brook watershed. This includes taking steps to prohibit and discourage use of the area for camping or other activities. • Continue to monitor the VAG mine property for signs of off-site migration. Take appropriate actions should this monitoring identify issues. • Develop an education and awareness campaign aimed at informing/encouraging residents to minimize exposure to asbestos by staying off the VAG mine property. • Continue discussions with the owners and occupants of the on-site residence and seasonal cabin in the downstream wetland area regarding appropriate measures at these locations. In general, exposure to asbestos at these locations is of concern and steps should be taken to minimize such exposure.

