

Q: What is naturally occurring asbestos?

A: Naturally occurring asbestos (NOA) refers to fibrous minerals that are found in certain rocks or soil as a result of natural geological processes. NOA does not refer to commercially processed, asbestos-containing material, such as insulation and fire protection in buildings or automobile brake linings, or asbestos mining and processing operations. Natural weathering and routine human activities may disturb NOA-bearing rock or soil and release mineral fibers into the air, which pose a greater potential for human exposure by inhalation.

Q: What does NOA look like?

A: NOA typically has a crystal formation of thin and long fibers that cannot be seen without the use of a microscope. There are two general classes of asbestos—chrysotile and amphibole. Chrysotile asbestos has long, curly, and flexible fibers and amphibole has fibers that are brittle and rod or needle-shaped.



Chrysotile asbestos fibers.

Amphibole asbestos fibers.

Q: Where is NOA found?

A: The US Geological Survey (USGS) has an ongoing project to map the locations of historical asbestos mines, former asbestos exploration prospects, and natural asbestos occurrences. NOA has been reported in at least 35 states, including Pennsylvania.

In Pennsylvania, NOA is present in specific geological formations, including ultramafic rock and serpentine rock, and can be in rock that is deep in the ground or near the surface. The amount of asbestos typically present in these rock formations can range from less than 1% up to about 25%. Other rock types known to host asbestos include some mafic rocks, metamorphosed dolostones, metamorphosed iron formations, carbonatites, and alkalic intrusions. Not all of these types of rocks contain NOA; they only have the potential to contain it.



Chrysotile asbestos fibers on serpentine stone.

Q: How can I find out if NOA exists near my home or workplace?

A: USGS has an ongoing project to map the locations of historical asbestos mines, former asbestos exploration prospects, and natural asbestos occurrences. To locate NOA areas in a specific part of the country, begin by consulting these USGS reports available at <https://mrdata.usgs.gov/asbestos>.

Q: How can NOA be released in the air and surrounding environment?

A: NOA can be released into the air and surrounding environment from its bound form if rock containing NOA is broken, crushed, or frayed either by human activity or by natural weathering processes, especially in drier months. NOA that is airborne can contaminate nearby water sources.

In outdoor rural areas that are not near known asbestos sources, background levels of asbestos in the air are about 10 fibers per cubic meter (fibers/m³) or 0.00001 fibers per milliliter (fibers/mL). Due to the wearing down or disturbance of manufactured products, including insulation, automotive brakes and clutches, ceiling and floor tiles, drywall, roof shingles, and cement, typically found in more urban settings, levels found in cities can be up to 10 times higher.

Q: What is the United States doing to regulate NOA?

A: The Occupational Health and Safety Administration (OSHA) has standards to protect individuals working in the general industry, shipyards, and construction from the hazards of NOA, and DEP Bureau of Air Quality enforces these standards. The allowable limit of asbestos fibers in workplace air is 0.1 fibers per cubic centimeter during an 8-hour day and 40-hour week (this limit is known as the permissible exposure limit, or PEL). Levels cannot exceed 1.0 fibers per cubic centimeter during a 30-minute period (also known as the excursion limit, or EL). The employer must ensure that no one is exposed above these limits through regular assessments and monitoring of workplaces covered by standards. If the exposure has the potential to be above the PEL/EL, employers must use proper work controls and practices to reduce exposure to the lowest level achievable and then supplement with proper

respiratory protection to meet the PEL. Exposure monitoring records must be kept for at least 30 years. Additionally, the Environmental Protection Agency (EPA) banned new uses of asbestos in 1989, though uses established before this date are still allowed. EPA also works to ensure that asbestos is controlled in school buildings to prevent exposure. EPA limits asbestos in public drinking water to seven million fibers/L.

DEP's Bureau of Air Quality enforces federal asbestos regulations and state regulations that protect potentially exposed workers and the surrounding community.

Q: How can I be exposed to NOA?

A: Previous studies have documented that environmental exposure to NOA can occur in communities near specific geological formations that contain NOA, but the risk for exposure is highly dependent on climate, weather patterns and activity, and type of regional geology. You might also be exposed to NOA through routine activities that can crush NOA-containing rock or disturb dust in NOA-containing soils. The following are some examples of these activities:

- Working in your yard or garden
- Digging or shoveling dirt
- Riding bicycles on unpaved surfaces
- Riding off-road vehicles such as four-wheelers and dirt bikes
- Running and hiking on unpaved surfaces
- Driving over unpaved surfaces

Q: How can I reduce exposure to NOA at home and the workplace?

A: NOA should be avoided and left alone. If rock containing NOA is intact and undisturbed, your risk of exposure is low.

If you live in an area where NOA has been disturbed and is likely to become airborne, you can limit exposure by taking the following steps:

- Walk, run, hike, and bike only on paved trails.
- Play only in outdoor areas with a ground covering such as wood chips, mulch, sand, pea gravel, grass, asphalt, shredded rubber, or rubber mats.
- Pave over unpaved walkways, driveways, or roadways that may have NOA-containing rock or soil.
- Cover NOA-containing rock or soil in gardens and yards with asbestos-free soil or landscape covering.
- Pre-wet garden areas before digging or shoveling soil.
- Keep pets from carrying dust/dirt on their fur or feet into the home.
- Use doormats and remove shoes before entering your home to prevent tracking in dirt.
- Keep windows and doors closed on windy days and during nearby construction.

- Drive slowly over unpaved roads.
- Use a wet rag instead of a dry rag or duster to dust.
- Use a wet mop on non-carpeted floors.
- Use washable area rugs on your floors and wash rugs regularly.
- Vacuum your carpet often using a vacuum with a high-efficiency particulate air (HEPA) filter.

If work-related activities in an area determined to have NOA cannot be avoided, then risk minimization procedures should be considered. These include (but may not be limited to):

- If NOA-exposure is above the PEL/EL, have proper hazard communication and warning signs in the area.
- No smoking, eating, drinking, or visitations should occur in these areas, and proper PPE must be provided and used to prevent exposure.
- Separate decontamination and lunch areas with proper hygiene practices must be provided to workers exposed above the PEL to avoid contamination. If possible, shower and change clothes before leaving work, and place dirty work clothes in a plastic bag until they can be washed. Do not shake out clothes before washing them.
- Before you disturb rock or soil that is likely to contain NOA, have an adequate protocol in place to control and contain the dust, and notify surrounding communities to avoid being outside or downwind of the site prior to the event.
- If the rock or dirt contains NOA, keep it wet while you're working, and seal it under a layer of clean soil and a layer of pavement, turf, or clean gravel to suppress the spread of dust.
- When drilling rock, put water in the drill stem or use a drill that collects dust. Wash equipment when you finish work.
- If disposing of NOA onsite, bury it and cover the surface with organic mulch or soil, or at least 100 millimeters of rock or gravel from an NOA-free source. If the NOA material requires offsite disposal, it must be transported in a sealed vehicle and lawfully disposed of at a disposal site approved by the U.S. Environmental Protection Agency.
- Reduce driving speed on unpaved roads that may contain NOA and frequently clean vehicles driven on roads that may contain NOA.
- Train workers on the dangers of exposure and how to take precautions. Training records must be kept for at least one year beyond the last date of employment.
- Provide medical surveillance and examinations to workers who experience exposure at or above the PEL/EL. Worker medical surveillance records must be retained for the duration of employment plus 30 years.

For full regulations regarding NOA at the workplace, please visit OSHA's Asbestos website at <https://www.osha.gov/SLTC/asbestos/>.

Q: How can NOA enter and leave my body?

- Inhalation: Breathing in the asbestos fibers is the primary way people are exposed to NOA. If you breathe asbestos fibers into your lungs, some of the fibers will be deposited in the air

passages and on the cells that make up your lungs. Most fibers are removed from your lungs by being carried away or coughed up in a layer of mucus to the throat, where they are swallowed into the stomach. This usually takes place within a few hours. Fibers that are deposited in the deepest parts of the lung are removed more slowly, and some can remain in place for many years and may never be removed from your body.

- Ingestion: If you swallow asbestos fibers (either those present in water or those that are moved to your throat from your lungs), nearly all the fibers pass along your intestines within a few days and are excreted through bowel movements. A small number of fibers may penetrate cells that line your stomach or intestines, and a few penetrate all the way through and get into your blood. Some of these become trapped in other tissues, and some are removed in your urine.
- Skin contact: If you get asbestos fibers on your skin, very few of these fibers, if any, pass through the skin into your body.

Q: How can being exposed to NOA affect my health?

A: NOA may be a health risk if disturbed, and asbestos fibers are released into the air and surrounding environment. Airborne asbestos fibers can pose a health hazard because of the potential risks associated with inhalation of the fibers. If NOA is not disturbed and asbestos fibers are not released into the air, then it will not pose a health risk.

Being exposed to NOA does not mean you will develop health problems. Visiting a health provider is necessary to determine whether you are at risk for health problems from NOA exposure. Many things need to be considered when evaluating your risk, including:

- How long and how frequently you were exposed.
- How long it has been since your exposure started.
- How much NOA you were exposed to.
- If you smoke cigarettes (cigarette smoking with NOA exposure increases your chances of getting an asbestos-related disease, such as lung cancer).
- The size and type of asbestos to which you were exposed.
- Other pre-existing lung conditions.

However, health risks associated with exposure to asbestos that is naturally occurring in the environment (i.e., not asbestos used commercially) are not yet fully understood. Recent studies and investigations by EPA, the US Agency for Toxic Substances and Disease Registry (ATSDR) are increasing our understanding of the potential health risks associated with NOA. Still, we know all forms of asbestos are carcinogenic and have the potential to lead to adverse health effects.

Q: What are some types of asbestos-related diseases and their symptoms?

A: Asbestos-related diseases can be either non-cancerous or cancerous:

Non-cancerous

- **Asbestosis** is scarring of the lungs. It is typically caused by very high exposure levels over a prolonged period of time, as seen in work-related asbestos exposure. Smoking increases the risk of developing asbestosis. Some late-stage symptoms include progressive shortness of breath, a persistent cough, and chest pain.
- **Pleural changes** or **pleural plaques** include thickening and hardening of the pleura (the lining that covers the lungs and chest cavity). Most people will not have symptoms, but some may have decreased lung function. Some people may develop persistent shortness of breath with exercise or even at rest if they have significantly decreased lung function.

Cancerous

- **Lung cancer** is a cancer of the lungs and lung passages. Cigarette smoking, combined with asbestos exposure greatly increases the likelihood of lung cancer. Lung cancer caused by smoking or asbestos looks the same. Symptoms of lung cancer can vary, but late-stage symptoms can include chronic cough, chest pain, unexplained weight loss, and coughing up blood.
- **Mesothelioma** is a rare cancer mostly associated with asbestos exposure. It occurs in the covering of the lungs and sometimes the lining of the abdominal cavity. Some late-stage symptoms include chest pain, persistent shortness of breath, and unexplained weight loss. Coughing up blood is not common.

Q: How long after being exposed to NOA will it take for symptoms of asbestos-related diseases to appear?

A: Most people don't show any signs or symptoms of asbestos-related disease for 10 to 20 years or more after exposure, and almost all knowledge of the development of asbestos-related disease is from exposure to commercially used asbestos or work-related exposure. When symptoms do appear, they can be similar to those of other health problems. Only a doctor can tell if your symptoms are asbestos-related.

Q: What will my doctor typically do if an asbestos-disease is suspected?

A: Your doctor will first take your medical history and perform a physical exam. He or she will then decide if you need additional testing.

Q: What are some tests to help diagnose asbestos-related diseases?

A: Based on your medical history and physical exam, your doctor may or may not recommend any of the following tests if an asbestos-related disease is still suspected:

- A chest X-ray is the most common test used to determine whether you have received sustained exposure to asbestos. The X-ray cannot detect asbestos fibers, but it can detect early signs of lung changes caused by asbestos. If the chest X-ray shows spots on the lungs, they may or may not be asbestos-related. They may be normal variations or related to infections and other diseases. Only a doctor trained in reading X-rays can determine if a spot is asbestos-related.

- A pulmonary function test (PFT) is a noninvasive breathing test to see how well the lungs are working. In this test, a person blows big breaths into a machine, which measures how much air is exhaled and inhaled over a period.
- A computerized tomography (CT) scan is a type of X-ray machine that usually delivers a much higher dose of radiation than a chest X-ray. A CT scan may be more sensitive than a chest X-ray in detecting the early stages of the disease. A CT scan is recommended only when the chest X-ray is inconclusive.
- For a test called bronchoalveolar lavage (BAL), a small flexible tube is inserted through the nose and down the airway. A small amount of saline solution is injected into the tube and then sucked back up. The fluid obtained contains saline, plus material from the lung. Illness from asbestos exposure generally cannot be predicted from this test. This test is performed only under special circumstances to assess possible disease activity and structural abnormalities.
- For a lung biopsy, samples of lung tissue are taken through a needle while the patient is sedated. This tissue is examined under a microscope. Lung biopsies are rarely performed because diagnosis is usually based on findings from the medical evaluation and other tests. A lung biopsy is not needed for most people who are diagnosed with an asbestos-related disease.
- Urine and sputum tests are not reliable for determining how much asbestos may be in the lungs. Nearly everyone has low levels of asbestos in these materials. These tests cannot predict the risk of illness.

Q: Should I have my children tested?

A: Taking X-rays of children’s lungs to look for asbestos-related disease is not currently recommended because changes to the lung usually take years to develop. In addition, X-ray radiation may pose a higher risk for children.

Q: What are some preventive measures I can take to avoid asbestos-related diseases?

A: If you have an asbestos-related disease or history of significant asbestos exposure, your doctor may recommend that you follow these preventive care guidelines:

- Regular medical examinations
- Regular vaccinations against flu and pneumococcal pneumonia
- Quit smoking if you are a smoker
- Limit further asbestos exposure

Following these preventive care guidelines may help reduce complications from asbestos-related disease or exposure. Your doctor may recommend other supportive care for complications and, if needed, treatment. Supportive care includes interventions that may help the symptoms of the disease, but it does not reverse the disease process.

Q: What is the PA Department of Health doing to address NOA-related concerns in PA counties?

A: PADOH is actively providing consultative support to state regulatory partners concerning the health effects of NOA exposure. Also, the PADOH/Division of Environmental Health Epidemiology will continue to respond to community concerns.

If you have any questions, contact us at env.health.concern@pa.gov.

Resources

ATSDR:

- Naturally Occurring Asbestos: <https://www.atsdr.cdc.gov/noa/index.html>

EPA:

- Managing Air Quality – Ambient Air Monitoring <https://www.epa.gov/air-quality-management-process/managing-air-quality-ambient-air-monitoring>
- Asbestos: <http://www.epa.gov/asbestos>.

US Department of Agriculture (USDA):

- Naturally Occurring Asbestos: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd551461.pdf
- Naturally Occurring Asbestos Locations in the Contiguous US and Alaska and the 100 Fastest-Growing US Counties: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5126451.pdf