Naturally Occurring Asbestos: Approaches for Reducing Exposure

Purpose and Intended Audience

This fact sheet provides an overview of approaches for reducing exposures to naturally occurring asbestos (NOA). It is intended to make general information about management options available to state and local government officials, project managers, and environmental professionals. The information should serve as a starting point for identifying current NOA management practices. In general, selecting an appropriate approach to reduce NOA exposure should be determined on a location-specific basis.

NOA management approaches can reduce but may not completely eliminate potential exposures to naturally occurring asbestos.

Information contained in this fact sheet was obtained from the currently available literature, including state and local government publications. To obtain more information on NOA management approaches, including their performance and frequency of use, refer to the resources provided at the end of this fact sheet.

Naturally Occurring Asbestos

NOA occurs in rocks and soil as a result of natural geological processes. Natural weathering and 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.

The U.S. Geological Survey (USGS) has an ongoing project to map the locations of historical asbestos mines, former asbestos exploration prospects, and natural asbestos occurrences. At least 35 states have reported NOA locations. To locate NOA areas in a specific part of the country, begin by consulting the USGS reports (see below) and contact a state geologist.

U.S. Geological Survey	• Eastern United States http://pubs.usgs.gov/of/2005/1189/ • Central United States http://pubs.usgs.gov/of/2006/1211/ • Rocky Mountain States http://pubs.usgs.gov/of/2007/1182/ • Southwestern United States http://pubs.usgs.gov/of/2008/1095/
California Geological Survey	Asbestos Reports, Maps, and Guidelines for Geologic Investigations • http://www.conservation.ca.gov/cgs/minerals/hazardous_minerals/asbestos/Pages/Index.aspx

In this fact sheet, NOA does not refer to commercially processed, asbestos-containing material, such as insulation and fire protection in buildings or automobile brake linings. Information about commercial asbestos-containing products is available in other publications, including the resources mentioned on EPA's asbestos Web page http://www.epa.gov/asbestos.

Approaches for Mitigating Exposures to NOA

The following general approaches to mitigate inhalation exposures to NOA are aimed at reducing NOA releases from rock or soil into the air:

- Leave NOA material in place and undisturbed
- Cover or cap NOA material
- Limit dust generating activities
- Excavate and dispose of NOA material

Approaches for reducing NOA exposure are similar to practices used for asbestos-containing materials in commercial applications.

Depending on the situation, a combination of engineering controls, work practices, and institutional (administrative) controls may be needed to implement an approach and reduce potential exposures to NOA. Selecting an approach depends on factors including:

- Accessibility of NOA (ground surface vs. below ground surface)
- Types of activities that disturb NOA (construction project vs. gardening)
- Climate and weather conditions
- Current and future land uses
- Technical and administrative feasibility of the approach

Typical engineering controls involve the use of covers and caps, vegetation, fencing, landscaping, and in some conditions, the application of water to suppress dust. Local factors, such as climate, influence the extent to which these approaches are implemented. For example, areas with dry or windy conditions may need more dust control than those with humid or less windy conditions.

Common work practices include limiting activities on NOA-containing areas, reducing driving speed on unpaved roads that may contain NOA, and cleaning vehicles driven over NOA. For example, during road construction or maintenance activities on unpaved areas where NOA is present, the Asbestos Airborne Toxics Control Measure (ATCM) for Construction, Grading, Quarrying, and Surface Mining Operations of the California Air Resources Board (ARB) requires that vehicle speeds not exceed 15 miles per hour.[1] Worker health and safety measures that include respiratory protection may be warranted. For information, consult with Occupational Safety and Health Administration Asbestos Standards for the General Industry and Asbestos Standards for the Construction Industry (http://www.osha.gov/SLTC/asbestos/hazards.html).

Examples of Engineering and Work Practices that Reduce Exposure to NOA

Excavation, Grading, or Utility Work at Construction Projects	• Wet road surfaces with water using trucks, hoses, or sprinklers[1] • Wet piles of excavated material and cover them with tarps, plastic sheeting, or other items[1] • Continuously mist the work area[1] • Install wind barriers around the work area[1] • Clean or decontaminate equipment and vehicles to ensure that no equipment or workers track soil out of the work area (a gravel pad, tire shaker, or wheel wash system may be used to clear soil from vehicles)[1] • Wet the work area using a spray system attached directly to rock cutting or drilling equipment, such as a fine-mist sprayer or a variable-rate fogger nozzle (similar to those used in fire fighting)[2] • Excavate utility trenches to an adequate depth and backfill them with clean soil so that future repair work will not need excavation into potential NOA-containing materials[3] • When transporting NOA-containing materials, avoid overloading trucks; keep the material below the top of each truck compartment and cover material with a tarp[4] • Limit personnel and vehicle access to the work area[5] • Identify NOA-containing areas with signs[2] • Reduce driving speed[1] • Reduce drilling or excavating speeds[6] • Excavate during periods of calm or low winds[1]
Roads and Parking Areas (unpaved and gravel roads)	• Cover roads with non-NOA-containing rock, chemical sealants or dust suppressants, chip seals, limestone aggregate, petroleum sealants, or asphalt cement paving[1, 7, 8] • Wet road surfaces with water[1] • Install windbreaks or berms[1] • Reduce driving speed[1] • Avoid dusty areas, especially in windy conditions[1]

Around Communities (playgrounds, ball fields, pathways, and gardens)	• Cover areas of rock and soil with clean soil, rock, vegetation, or other material (see next section, General Considerations for Using Covers or Caps)[3, 9] • Pave over unpaved walkways, driveways, or roadways containing NOA[1, 10] • Landscape areas with vegetation, such as NOA-tolerant plants, and add a layer of organic mulch or NOA-free soil. Water plants often until they are established to minimize erosion[9] • Water garden areas before digging[9] • Keep windows and doors closed on windy days and during periods when nearby rock or soil may be disturbed, such as during construction[9] • Limit track-in by using entryway (door) mats, and wipe down pets before they enter buildings to reduce the amount of soil tracked indoors[4, 9] • Allow children to play in outdoor areas only if the area has a ground covering, such as wood chips, mulch, sand, pea gravel, grass, asphalt, shredded rubber, or rubber mats[4] • Relocate outdoor activities to areas that do not contain NOA (walk, run, hike, and bike only on paved trails)[4] • Avoid dusty areas, especially in windy conditions[11]

General Considerations for Using Covers or Caps

One of the most common engineering controls is to place a cover system over the NOA. Cover materials may include clean soil or rock, concrete, chemical sealants or dust suppressants, chip seals, limestone aggregate, petroleum sealants, asphalt paving, geotextiles, wood chips, mulch, sand, pea gravel, shredded rubber, rubber mats, and vegetation.

The complexity of cover systems can vary from simple (e.g., a single soil layer) to complex (e.g., multiple layers of varying materials). Several factors, including cover material properties and site characteristics, affect the type of cover system appropriate for a particular area.

The availability of materials may influence the type of cover used. Materials that are readily available and close to the NOA area may be more desirable and cost effective than materials found farther away. For example, artificial turf and other imported materials may be more expensive than locally available soils. The cover material will likely need to be assessed for NOA or other undesirable constituents. Expected lifetime, maintenance, and monitoring requirements also affect the cost of covers.

The slope of the NOA area may influence the type and thickness of the cover material used. For example, steep slopes may need vegetation or shotcrete (concrete or mortar sprayed onto a surface with a pressurized hose) to promote slope stabilization. Steep slopes typically have a higher potential for erosion and therefore may demand thicker cover material.

The thickness of the cover material should provide a safety factor sufficient to ensure that airborne releases will not occur. Thicker covers may be needed in areas where there is a significant potential for erosion. The surface of a cover should protect against erosion by wind and rain. Materials used for erosion control typically include a layer of topsoil and vegetation. In areas where adequate vegetation is not possible, gravel, admixtures, or riprap may be used for the surface layer. The thickness of the cover may also depend on the presence of other cover components, such as irrigation lines.

A geotextile, which is a geosynthetic material made of polymer fabric, may be placed below the cover material to mark the presence of NOA and serve as an erosional indicator. Geotextiles also can provide protection, reinforcement, drainage, and separation when applied to the soil surface or between layers of materials. The California Department of Toxic Substances Control (DTSC) recommends that landscaped areas and play fields at schools include a geotextile marker covered by sufficient cover material to provide an effective barrier to reduce NOA exposures.[3] Placement of geotextile markers will demand additional time and expertise.

Long-Term Management Approaches

For long-term management of areas with NOA, institutional controls (ICs) and a maintenance plan may be desirable. In areas where NOA poses potential health concerns, local and state government officials should consider providing educational material to supplement engineering approaches for reducing exposures to NOA. The Agency for Toxic Substances and Disease Registry has developed a fact sheet about asbestos and NOA for the general public entitled "Asbestos and Health: Frequently Asked Questions."[4]

Institutional Controls

For additional information about ICs, refer to the Land Use Controls Web site at http://www.lucs.org

Generally, ICs are administrative or legal mechanisms that are designed to help minimize the potential for human exposure to contamination. They also protect the integrity of the engineering measures. ICs are generally divided into four categories:

- *Government controls* include laws and permits (such as local zoning laws and permits required for excavating or digging). Work that may disturb NOA-containing soil may require government approval and may be subject to local or state construction guidelines. In California, the ATCM of the California ARB requires owners and operators to notify the local air quality management district within one business day of discovering NOA, serpentine mineral, or ultramafic rock in an area to be disturbed by construction, grading, quarrying, or surface mining operations.[1] In Virginia, the Fairfax County Health Department requires a compliance plan that includes air monitoring to ensure effective dust control during construction in areas containing NOA.[2]
- *Proprietary controls* include property use restrictions based on private property laws, such as land use easements or covenants.
- *Enforcement tools* include legally binding documents that require individuals or companies to conduct or prohibit specific actions.
- *Informational devices* include deed notices, public advisories, and other measures (such as warning signs and worker health and safety awareness training) that alert and educate people about an area.

Maintenance Plan

A maintenance plan can help ensure that engineering controls and work practices remain effective. In California, for example, DTSC and school districts enter into an agreement to develop and implement an approved long-term operation and maintenance plan under DTSC oversight. These plans generally contain information about the following topics:[3]

- Building locations, utility line locations, and the thickness of cover material across the area
- Routine inspections

- Maintenance work, including erosion and storm water control
- Procedures for repairing cover damage
- Monitoring activities, such as perimeter or personal air monitoring
- Reporting format and frequency
- Restrictions on future activities that may expose NOA
- Management of imported soil and future excavation or trenching activities

Additional Information	
	• Agency for Toxic Substances and Disease Registry - http://www.atsdr.cdc.gov/NOA
	• California Air Resources Board - http://www.arb.ca.gov/toxics/asbestos/asbestos.htm
	• El Dorado County, California - http://www.co.el-dorado.ca.us/emd/apcd/asbestos.html
	• Fairfax County, Virginia - http://www.fairfaxcounty.gov/hd/asb
	• Sacramento County, California - http://www.airquality.org/compliance/asbestosNaturallyOccurring.shtml
	• U.S. Environmental Protection Agency - http://www.epa.gov/asbestos/pubs/clean.html

References

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10. Cal/EPA DTSC. 2006. "Fact Sheet: Recommended Housekeeping Activities to Reduce Exposure to Naturally-Occurring Asbestos in Schools." October. http://www.dtsc.ca.gov/Schools/upload/Recommended_Housekeeping_for_NOA_102306.pdf

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List of Acronyms

ARB	Air Resources Board
ATCM	Airborne Toxic Control Measure
DTSC	Department of Toxic Substances Control
ICs	institutional controls
NOA	naturally occurring asbestos
USGS	U.S. Geological Survey