Naturally Occurring Asbestos: A Needs Assessment of Local Health Agencies

A Report to Local Public Health Agencies, prepared by the Environmental Health Investigations Branch, California Department of Public Health

Photomicrograph of tremolite asbestos from El Dorado County, California. Photo by Mike Fuller, California Geological Survey, California Department of Conservation.

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Abstract

Large regions of the western United States, including most counties in California, contain abundant naturally occurring asbestos (NOA) deposits. Any activity that disturbs the soil can result in NOA fibers becoming airborne, including construction grading, driving and cycling on unpaved roads, gardening, and playing on soil. Studies from other countries and a recent study in California have associated increased risks of asbestos-related disease with living in areas containing NOA deposits.

The California Department of Public Health (CDPH) initiated a needs assessment survey of the 45 counties in California with NOA deposits. The goal was to describe the NOA-related resources and needs of local health agencies for health educational materials, training, and technical assistance. Health Officers and/or Environmental Health Directors from 25 counties responded. In addition, three Health Officers provided in-depth responses to key issues in follow-up interviews.

Respondents from nine counties stated that their departments had the capacity to address NOA, while respondents from the other 16 stated that they did not. Three counties were actively addressing potential exposures to NOA by offering guidance for the construction industry and developing websites and fact sheets with NOA information. Training and/or guidance requested by the respondents included education on routes of exposures and health effects, NOA geology, sampling and analytical methodologies, and effective mitigation strategies.

The needs assessment survey was also distributed to 11 Air Pollution Control Districts (APCDs), based on recommendations by the Health Officers and Environmental Health Directors. Seven APCDs responded: all were actively addressing NOA through enforcement of state regulations. Six of the seven respondents stated that the state public health department could provide support and training, particularly with respect to informing community residents about potential health risks associated with NOA exposures.

Local health agencies report a broad range of NOA-related training needs. In California, multiple state agencies have different areas of public health authority and expertise regarding NOA. A multi-organizational venue, such as a state interagency working group, may be required for state agencies to provide a wide range of training needs and other resources identified by local health departments.
Introduction

Geology and Geography of Naturally Occurring Asbestos (NOA) in California

Asbestos is a commercial name given to the fibrous forms of six different minerals: chrysotile, amosite, tremolite, actinolite, crocidolite, and anthophyllite. When these minerals occur in a crystalline, fibrous form that is resistant to chemical and thermal degradation, they are considered to be asbestos. Chrysotile belongs to the serpentine family; the other five minerals belong to the mineral group known as amphibole. Chrysotile fibers are flexible and curved, whereas amphibole asbestos fibers are generally brittle and often have a needle-like shape.

All six minerals occur in or are generally associated with ultramafic rock, an igneous rock containing mainly iron-magnesium-silicate minerals. Ultramafic rock is commonly found along fault lines. The western region of the United States is particularly abundant in ultramafic rock and soil. Areas of ultramafic rock in California have been mapped by the California Geological Survey.\(^1\) While geological conditions may specify areas of probable asbestos formation, not all ultramafic rock contains asbestos. Additionally, the small scale of the state map (1:1,100,000) precludes showing detailed boundaries and small deposits of ultramafic rock. Nonetheless, 44 of the 58 counties in California contain ultramafic rock and therefore are considered likely to harbor NOA as well. NOA also occurs in Sacramento County, in association with volcanic rather than ultramafic rock.

Potential Human Health Impacts of Exposure to Naturally Occurring Asbestos (NOA)

Asbestos fibers are released when rock or soil is crushed or otherwise disturbed through human activity or natural weathering processes. These microscopic fibers can become airborne. When these fibers are inhaled, they may reside permanently in the lung or migrate to other tissues. The U.S. Environmental Protection Agency (U.S. EPA) considers material containing one percent or more of asbestos by weight to be a hazardous substance.\(^2\) A study in California suggests that soil levels ranging from 0.0001 to 8.8% asbestos can release significant numbers of fibers to the


Chronic occupational exposure to asbestos is known to cause lung cancer, mesothelioma, and nonmalignant lung and pleural disorders. More recently, health risks have been associated with environmental exposures as well. Residents of areas with NOA from around the world, who had no occupational asbestos exposure, have been reported to have markedly elevated risks of mesothelioma (i.e., by several hundred percent). Environmental exposures to tremolite asbestos have been associated with increased incidence of radiographic abnormalities. Among residents of California, an analysis of cancer registry data suggests that the risk of mesothelioma increases with residential proximity to NOA. Interpretation of those findings, however, is limited by: i) incomplete occupational and residential histories of the study subjects; and ii) the lack of specificity of the NOA maps which were used as a proxy for exposure. Nevertheless, the results of these studies document that in areas with NOA there are potential asbestos-related health risks. Significant soil and rock disturbance, resulting in release of asbestos fibers into the air, may occur at construction sites and housing developments. Exposures may also occur during activities of daily living, including gardening, children playing on soil, or during recreational activities such as mountain biking and baseball.


Public Health Response to NOA in California

Federal, state, and local public health agencies have responded to the potential health risks associated with exposures to NOA with air and soil sampling studies, legislation, and public health guidance. The U.S. EPA assessed asbestos exposure in public areas. Most notably, at the Clear Creek Management Area, a popular area for off-road vehicles,\(^8\) and in El Dorado Hills, asbestos air levels created during simulated sports activities (involving soil disturbance) were comparable to those found in occupational settings.\(^3\) The U.S. Agency for Toxic Substances and Disease Registry (ATSDR) has reviewed sampling and health information and has described 14 actions that residents of NOA areas can take to reduce exposures, including walking only on paved trails, using doormats, and shutting windows on windy days.\(^9\)

In California, the public health response to NOA is complex, involving multiple state public health agencies with different jurisdictions and realms of expertise. Both the Office of Environmental Health Hazard Assessment (OEHHA),\(^10\) within the California Environmental Protection Agency (Cal/EPA), and the California Department of Public Health (CDPH) provide overall health risk guidance. Specific mitigation guidance is provided by the California Air Resources Board (CARB) and the Department of Toxic Substances Control (DTSC), while geological expertise is provided by the California Geological Survey (CGS), which is housed within the California Department of Conservation. DTSC has concluded that roads surfaced with serpentine aggregate can be an important source of airborne asbestos fibers.\(^11\)

One statewide public health response to NOA has consisted of a rule promulgated by CARB under the Toxic Air Contaminants Program, referred to as the Asbestos Airborne Toxic Control Measure (ATCM). These CARB regulations have reduced exposures during construction through various measures, including dust suppression and lowering allowable asbestos content for surfacing applications from 5% to less than 0.25%.\(^12,13\) Local air pollution control agencies are mandated to enforce this ATCM and their

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professional organization, the California Air Pollution Control Officers Association, has compiled extensive resources.\(^{14}\)

The California Legislature took an interest in the NOA issue with Senate Bill (SB) 655 (Ortiz, 2005). This bill would have created a “Naturally Occurring Asbestos Task Force” at Cal/EPA to develop guidance for mitigating risks associated with NOA, and would have required state and local governments to map NOA sites and notify residents in those areas about NOA risks. However, although SB 655 passed in the Senate, it was rejected by the Assembly.

In El Dorado County, where new housing has been built in areas with serpentine rock, local agencies have created dust enforcement regulations and programs.\(^{15}\)


\(^{15}\) El Dorado County, Air Pollution Control District. Beacon Dust Enforcement Program. http://www.co-el-dorado.ca.us/emd/apcd/PDF/BEACON_Dust_Enforcement_Program.pdf
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Needs Assessment

Within CDPH, the Environmental Health Investigations Branch (EHIB) conducts health and exposure investigations and surveillance, provides public health oversight and technical assistance to local health agencies, and facilitates public participation in environmental research. As part of a state public health agency, EHIB is concerned with the widespread distribution of NOA and the potential for human exposure in California. Although EHIB is familiar with efforts to reduce exposures to NOA in El Dorado County, there had been, as of 2006, no concerted effort to understand public health responses to NOA by local agencies in other counties.

A Public Health Prevention Specialist in training at the U.S. Centers for Disease Control and Prevention (CDC) was assigned to work with EHIB for one year, during which she developed and implemented an assessment of the needs and resources of local public health agencies in relation to NOA. During March through June 2007, three data collection efforts were undertaken:

1. **Survey:** Health Officers and Environmental Health Directors (EHDs) in the 45 counties containing NOA were sent an e-mail questionnaire covering several general areas:
   a. their assessment of the public health priority of NOA for their agency
   b. NOA educational and outreach activities and resources and maps used
   c. resources and needs for specific health education materials, training, and technical assistance

2. **Air Pollution Control District Interviews:** Local air pollution control district personnel were contacted and interviewed based on suggestions from Health Officers and EHDs.

3. **Supplemental Questionnaire:** Health Officers in several counties were contacted with a supplemental questionnaire to solicit more in-depth responses to key questions.

Prior to data collection, eight counties were categorized as “priority” counties (Amador, Calaveras, El Dorado, Fresno, Lake, Placer, Sacramento and San Benito), based on the presence of NOA and population size. As noted below, emphasis was placed on obtaining responses from representatives of these counties.
1. Survey of County Health Officers and Environmental Health Directors

A questionnaire was e-mailed to the Health Officers and EHDs in the 45 counties believed to contain NOA. Three reminder e-mails were sent to all non-responding counties and reminder phone calls were made to the priority counties. Twenty-eight responses (10 from Health Officers and 18 from EHDs) were received, representing 25 counties — a response rate of 56%. Of the eight priority counties, seven responded.

Priority Ranking

Health Officers: None of the ten responding Health Officers ranked NOA as a “high” priority for their department. All five who ranked it as a “medium” priority cited geography as a factor in their rankings, e.g., “proximity to other counties that have had problems.” Four of the responding Health Officers supported their “medium” or “low” rankings based on some degree of risk assessment:

- “Decreasing rates of mesothelioma in community residents”
- “We do not have a higher than expected rate of mesothelioma”
- “Risk of exposure on construction projects is not clearly established”
- “Only a small percentage of NOA is friable which constitutes a low health risk”

Other reasons cited by the Health Officers for “low” rankings were a lack of funds to assess NOA and the perception that environmental stakeholders did not see NOA as a significant priority.

Environmental Health Directors: One EHD ranked NOA as a “high” priority for his county based on media attention and public concerns and the occurrence of construction projects in areas “more likely” to contain NOA. The 17 other EHDs’ ratings of NOA as a “medium” or “low” priority were based primarily on geography, for example:

- “Areas of NOA in the county are in remote areas with little construction”
- “We are not aware of NOA within our jurisdiction.”

Other factors influencing EHD rankings included lack of funding and a judgment that NOA was within the realm of responsibilities of other local agencies, i.e., the local Air Pollution Control District.

Resident Perspective: The Health Officers and EHDs were asked how they thought their residents would rank NOA as a priority. No Health Officer or EHD ranked NOA as a “high” priority for their residents. The one “medium” response stated that NOA was considered an issue that varied with geography and affected communities differently. “Low” priority responses
included similar factors as well as observations that residents were simply
unaware of the presence of NOA in their county.

**Education and Outreach**

**Inquiries Received:** Respondents from five counties stated that their
departments received inquiries from residents on the topic of NOA. The
majority of inquiries were questions about health effects from NOA expo-
sure, but residents also had concerns about dust control regulations,
exposure assessment and reduction, mapping, and real estate.

**Public Education Provided:** Four counties indicated that they used ex-
ternal fact sheets, most notably an ATSDR fact sheet² and a CARB bro-
dchure.¹⁶ Three counties were conducting educational activities on NOA
exposure. El Dorado County conducts the greatest number of activities:
the county offers NOA workshops to the construction industry. Mitigation
approaches, periodic updates on NOA issues to the public, and accessible
local maps are posted on the county’s website.¹⁷ The Health Officer from
Sacramento has developed a presentation on the health effects of asbes-
tos for use with communities.¹⁸

**Mapping:** Departments from four counties indicated that they had used
the State ultramafic rock map to respond to inquiries from the public. Three
counties had developed local maps of areas “most” likely to contain NOA.

**Requested resources and assistance**

Although nine counties stated that they had the capacity to address NOA,
14 counties, including all of the priority counties, responded that they
lacked such capacity. When asked “What are the barriers for your depart-
ment in addressing NOA exposures?” these counties mentioned the need
for additional training/guidance. Requested resource areas included:

**Training/Guidance:**

- “Education on routes of exposure and health effects”
- “Thresholds and procedures to evaluate NOA exposures”
- “Knowledge of key players in NOA oversight and expertise”
- “Promulgation of federal/state regulatory standards”
- “Consistent and economical air and soil sampling and analytical methods”

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¹⁶ California Air Resources Board. Asbestos-Containing Rock and Soil—What California Homeowners and Rent-
ers Need to Know. http://www.arb.ca.gov/toxics/asbestos.htm


• “Methods of processing development projects where NOA might be present”
• “Effective and acceptable forms of mitigation”
• “Best practices and medical guidance for community-based physicians in advising patients and community members regarding non-occupational exposure to NOA”

Funding: Respondents from half of the 14 counties indicating a lack of capacity identified funding needs for: mapping, training and hiring of staff, monitoring and assessment, and for education and outreach. One Health Officer commented: “We are under-staffed and under-funded. The outreach I have done has been on my own time.”

Other Comments

Building standards: One respondent stated that current regulations requiring building contractors to follow specific guidelines adequately addressed the issue of NOA. In contrast, one county highlighted the lack of established standards. The respondent for the latter county explained that the uncertainty about health risks of NOA was a constant barrier, even in light of stringent construction fugitive dust regulations and NOA-hazard post-construction mitigation requirements within his county.

Role of Air Pollution Control District: Ten EHDs and three Health Officers suggested that eleven local Air Pollution Control Districts (APCDs) be contacted. Three EHDs considered NOA to be within the jurisdiction of the APCD. One EHD commented that “the APCD handles all NOA issues” while another commented that “the current structure and functions of environmental health are not well suited to it.”

2. Air Pollution Control Districts (APCDs)

Subsequent to the initial survey of Health Officers and EHDs, the Needs Assessment survey questions were revised to make them more suitable for Air Pollution Control Officers (APCOs). Of 11 APCDs contacted, seven (representing Amador, Bay Area, Placer, Sacramento, San Joaquin Valley, San Luis Obispo, and Yolo-Solano) completed the revised questionnaire, mostly by telephone interview, a 64% response rate. Respondents were either the APCO (n=4) or a staff person designated by the APCO (n=3).

Priority Ranking

Three APCDs (Bay Area, San Joaquin Valley and San Luis Obispo) ranked NOA as a “high” priority. This ranking was based on community concerns received at times when development or construction was taking place in
NOA areas. One respondent based a high ranking on the agency’s legal obligation to enforce the asbestos ATCM. Similar to the Health Officers and EHDs, APCD staff who ranked NOA as a low priority based their ranking on geography.

Education and Outreach
Six of the seven responding APCDs reported having received NOA-related inquiries from the public. The most common topic of inquiry addressed health effects, followed by mapping and real estate purchase or value. Five APCDs reported having websites with NOA information and agency links, as well as other activities, including:

- “APCD flyers have been distributed to planning and building departments to be given to persons living or owning properties where NOA is likely”
- “Education is done with contractors or home owners… who are applying for permits in NOA areas”

Additional Activities
Mapping: APCDs with local maps of NOA areas were asked additional questions about funding and map usage. Both Placer and Sacramento had contracted with the California Geological Survey (CGS) to create county maps of the likelihood of the presence of NOA. In Placer County, mapping was funded three-quarters by the APCD and one-quarter by the CGS. This APCD indicated that there are plans to have the higher-resolution map placed on the APCD’s website, which would allow residents to query for parcels of interest. San Luis Obispo APCD took an innovative approach, involving the county geologist in creating buffer zones around NOA areas identified on the state map, and then using those zones to trigger the ATCM permit requirement.

Policies/Regulations/Guidelines: APCDs identified policies most effective in addressing NOA. All of the identified policies were specified in relationship to the ATCM, including:

- “Enforcing Asbestos ATCM 93105”
- “Requiring stringent dust mitigation plans”
- “Conducting routine inspections of construction sites in NOA areas”

21 Placer County Air Pollution Control District. Naturally Occurring Asbestos: General Information. http://www.placer.ca.gov/Departments/Air/NOA.aspx
• “Setting action and stop work thresholds for monitor excursion"
• “Requiring above normal watering levels compared to non-NOA construction sites”

Additional local activities that could be conducted were also identified, including:
• “NOA checkbox on grading permits or local dust control plans”
• “Application review fees”
• “Posting larger scale maps to the District website so developers can interactively query for project applicability under the ATCM”

Requested resources and assistance

Barriers to addressing NOA exposures included the lack of exposure limits and standards for air monitoring and the lack of information on assessing risk based on asbestos type (i.e., amphibole versus chrysotile). Respondents in all but one APCD saw a role for the state health department in providing support to counties with regard to NOA. The sole “no” response described a greater need to respond to public calls about “possible asbestos exposure from renovated buildings.” This respondent suggested that the “time and efforts of the CDPH would be better spent on looking at asbestos in buildings.” Specific requests included:
• “Staff and funding to create a program including geologists and funding to sample in ultramafic rock areas”
• “Research conducted and communicated to counties to assist them in making risk assessments (e.g., standardized methodologies for determining exposure such as counting and collecting fibers; and risk associated with asbestos types)”
• “Repeat a one-day scientific conference held by the Geological Society of America in April 2005”
• “Enhanced mapping of counties that would allow local agencies to take action based on identified NOA areas”
• “Support developing local plans to address NOA in the future as construction and development increase”
• “Provide independent review of local efforts and mitigation plans”
• “Government mandated notification of NOA areas to landowners and/or support to educate communities by sending out mailings to residents”

3. “Supplemental Questionnaires”— County Health and Environmental Health Departments

Of the eight priority counties contacted to participate in a supplemental questionnaire, three chose to participate (Amador, Placer and Sacramento). In two counties, the Health Officer responded, and in the third, the Health Officer and the EHD collaborated in their response. The responses highlighted county capacity and needs in several areas:

**Educational Materials:** All respondents emphasized the need for more information on health effects and personal risk assessment in order to educate the public.

**Policies:** When asked “Which policies have been most effective in addressing NOA in your county?” respondents indicated that the local implementation of the state’s ATCM had been effective. One respondent also mentioned that the county had adopted a policy of responding to dust complaints within 15 minutes. In addition, counties were asked to comment on Senate Bill 655, which would have required sellers of real estate to disclose whether the property was located in a NOA hazard zone. Comments included:
- “Curious about the purpose. How will disclosure help people to make decisions if the science is not available to assess risk?”
- “Disclosure is desirable since a better informed public can address potential hazards.”

**Barriers:** One health department respondent stated that NOA was being addressed by the local APCD, and emphasized the need for counties to prioritize in order to reduce potential duplication of resources and ensure that all issues were addressed by at least one agency.

**Requested Assistance:** Suggested opportunities for the state health department to support the work of county health departments included updates on the latest health effects information, conducting or at least advocating for additional studies of NOA health effects, effective mitigation efforts, and policy recommendations. One respondent also highlighted the need for medical guidance or best practices for physicians with regard to advising patients about exposure to asbestos.
Conclusions

Local health agencies have taken leadership in addressing NOA

Several local public health agencies have been actively involved in assessing and reducing exposures of residents to NOA. Not only have these local agencies been guided by state policies, notably the state ATCM, but several counties have developed policies and have instituted NOA review fees to support implementation of the state ATCM. In priority counties where there are NOA deposits in areas of new development, the Health Officers, EHDs, and APCDs are all involved in responding to potential NOA exposures.

Estimate of health risk guides the local public health response

Perceptions of NOA health risks by the Health Officer and local environmental stakeholders guided the priority level placed on NOA by the local Health Officer. The uncertainty in health risks was cited as a barrier to local public health response by Health Officers, EHDs, and APCOs, even with respect to specific mitigation guidance. The Health Officers’ request for the state to conduct epidemiological studies suggests a need for greater certainty and understanding of the health risk. Nonetheless, asbestos-related disease takes decades to develop. Therefore, detecting any increase in asbestos-related illnesses from relatively recent activities such as housing development would not be feasible.

Mapping is a valuable tool in responding to the public health risks of NOA

The state NOA map was used by local agencies to assess the magnitude of the potential health risk in their counties and to respond to inquiries from the public. Counties that have created local NOA maps have used them to educate residents of NOA areas as well as to enforce fugitive dust regulations. CGS has been instrumental in assisting counties to develop county-level maps through technical assistance and, in one case, funding. One APCD is taking a very innovative approach, using the county geologist to identify zones that trigger the ATCM permit requirement. However, given that only 56% of counties responded to our initial survey, there may be local public and environmental health agencies in non-responding counties whose staff members are unaware of NOA in their jurisdictions.
Community awareness and education programs are needed

County agencies in priority NOA counties are aware of and currently use a variety of educational materials and agency resources to address NOA. Several APCDs are clearly addressing new construction. Residents in NOA areas, however, may be unaware of potential exposures and associated health risks from other activities, e.g., gardening. Responses indicated that local agencies are aware that NOA may become a higher priority as development in NOA areas occurs and that there is a need to plan for a “solid” NOA educational program.

Local agencies request training and guidance from state agencies

Health Officers, EHDs, and APCOs emphasized the importance of experts within state public health agencies providing a broad range of expertise and services, including training about potential health risks of asbestos, conducting epidemiological studies, providing sampling and analytical expertise, leading policy development, and assisting in promoting awareness and education to community residents about potential health risks of NOA. Specific guidance from the State to local public health agencies could include:

**Health Risk Guidance Materials:** Health Officers, EHDs and APCOs wanted to learn more about asbestos health risks and epidemiological studies. A public health technical document that addresses the concerns of local public health agency staff, e.g., the health risks of different fiber types, would be useful for local health agencies. A standardized health effects presentation which Health Officers could use when addressing communities might also be useful.

**Trainings:** A conference, workshop or professional forum on NOA for county health departments and local environmental health agencies, in which local agency staff members have the opportunity to ask questions, may be an effective venue to provide training. Topic areas for the agenda could include:

- overview of federal and state agency roles, mandates, and expertise
- geology of NOA in California and use of the state NOA map as a local assessment or ATCM implementation tool
- current science on NOA health effects, including animal toxicology and human epidemiological studies of asbestos-related diseases
• lessons learned from priority counties, notably Placer, Sacramento and El Dorado, in addressing NOA through policy, educational materials, and outreach activities
• sampling and analytical methods for evaluating NOA concentrations in air and soil

Mapping: Additional mapping for counties at the parcel level would be helpful in communicating risks to residents.

Coordination among state agencies is needed
Staff from CDPH and OEHHA can make presentations on the potential health risk of NOA in a variety of established forums, e.g., meetings of the California Conference of Local Health Officers, the American Public Health Association, and the California Air Pollution Control Officers Association. Clearly, however, local public health agencies have a broad scope of training needs that will require expertise and resources from several state agencies. As described on page 5, five separate departments within California state government have different areas of public health authority and expertise with respect to NOA. For state agencies to address the breadth of training needs identified by county health departments, a forum or venue for coordination and collaboration, such as an inter-agency working group, may be required. A coordinated approach would improve communications about potential public health risks of asbestos and reduce Californians’ exposure to asbestos.