California Environmental Protection Agency

Air Resources Board

STAFF REPORT: INITIAL STATEMENT OF REASONS FOR THE PROPOSED ASBESTOS AIRBORNE TOXIC CONTROL MEASURE FOR CONSTRUCTION, GRADING, QUARRYING, AND SURFACE MINING OPERATIONS

Stationary Source Division
Emissions Assessment Branch

Release Date:
June 8, 2001

State of California
AIR RESOURCES BOARD

STAFF REPORT: INITIAL STATEMENT OF REASONS FOR PROPOSED RULEMAKING

Public Hearing to Consider

ADOPTION OF THE PROPOSED ASBESTOS AIRBORNE TOXIC CONTROL MEASURE FOR CONSTRUCTION, GRADING, QUARRYING, AND SURFACE MINING OPERATIONS

To be considered by the Air Resources Board on July 26, 2001, at:

Ramada Plaza Hotel
Whitcomb Ballroom
1231 Market Street
San Francisco, California

Air Resources Board
P.O. Box 2815
Sacramento, California 95812

State of California
AIR RESOURCES BOARD

PROPOSED ASBESTOS AIRBORNE TOXIC CONTROL MEASURE FOR CONSTRUCTION, GRADING, QUARRYING, AND SURFACE MINING OPERATIONS

Executive Summary and Technical Support Document

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June 2001

ACKNOWLEDGMENTS

We wish to acknowledge the participation and assistance of the following local air districts:

Bay Area Air Quality Management District
El Dorado County Air Pollution Control District
Lake County Air Quality Management District
Mendocino County Air Quality Management District
North Coast Unified Air Quality Management District
Northern Sierra Air Pollution Control District
Placer County Air Pollution Control District
Sacramento Metropolitan Air Quality Management District
San Joaquin Valley Unified Air Pollution Control District
Tuolumne County Air Pollution Control District

The ARB would also like to acknowledge the assistance of the following individuals, agencies, and organizations for their participation and assistance:

Jeff Cook, Monitoring and Laboratory Division, ARB
George Lew, Monitoring and Laboratory Division, ARB
Kathy Gill, Monitoring and Laboratory Division, ARB
Douglas Ito, Planning and Technical Support Division, ARB
Robert Jenne, Office of Legal Affairs, ARB
Reza Mahdavi, Research Division, ARB
ARB Reproduction Staff, Administrative Services Division, ARB
Linda Davis, Stationary Source Division, ARB
Linda Keifer, Stationary Source Division, ARB
Ron Churchill, Department of Conservation, Division of Mines and Geology
John Clinkenbeard, Department of Conservation, Division of Mines and Geology
Dr. Melanie Marty, Office of Environmental Health Hazard Assessment
Rick Smelser, City of Gilroy
Karen Miller, City of American Canyon
Construction Materials Association
California Mining Association

Staff Report: Initial Statement of Reasons
for the Proposed Asbestos Airborne Toxic Control Measure
for Construction, Grading, Quarrying, and Surface Mining Operations

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Executive Summary

I. INTRODUCTION

In 1986, the Air Resources Board (ARB or Board) identified asbestos as a toxic air contaminant (TAC) based on its classification as a known cancer causing pollutant. In that process, the Board found that no threshold exposure level could be identified below which adverse health effects would not be expected.

Last year the Board approved amendments to an airborne toxic control measure (ATCM) that was originally adopted in 1990. This amended ATCM reduced the allowable asbestos content in materials used for surfacing applications from five percent to 0.25 percent. At that time, staff advised the Board that we would be returning with a complementary ATCM addressing asbestos emissions from construction, grading, quarrying, and surface mining operations. Air monitoring information, emission estimates using published emission factors, and site visits indicate that construction, grading, quarrying, and surface mining in areas with naturally-occurring asbestos can result in potentially harmful asbestos exposure to the general public. Because of this, staff is proposing an Asbestos Airborne Toxic Control Measure for Construction, Grading, Quarrying, and Surface Mining Operations. The proposed regulation is designed to require work practices that will minimize emissions of asbestos-laden dust from operations that occur in areas where naturally-occurring asbestos is found or is likely to be found. If approved by the Board, the proposed ATCM will be sent to the local air pollution control or air quality management districts (districts) to be implemented and enforced. The local districts may implement the proposed ATCM as approved by the Board, or adopt an alternative rule at least as stringent as the ATCM.

II. BACKGROUND

1. <u>Why is the staff proposing an ATCM for Construction, Grading, Quarrying, and Surface Mining?</u>

Air monitoring conducted in California and Virginia has indicated that activities associated with construction, grading, quarrying, and surface mining in areas known to have naturally-occurring asbestos can result in offsite asbestos concentrations in the air that represent a potential hazard to public health. Because of the variability of asbestos concentrations and dust producing activities, exposures are variable over time and from location to location. However, air monitoring has demonstrated that actions currently being taken in some locations to control dust emissions from these activities are effective in reducing asbestos emissions.

This proposed regulation would apply to construction, grading, quarrying, and surface mining operations in areas identified as geographic ultramafic rock units on maps developed by the Department of Conservation (DOC), Division of Mines and Geology. This is consistent with the approach used in the Asbestos ATCM for Surfacing Applications, which the Board approved last year. The DOC has identified ultramafic rock, and its metamorphic derivative serpentine, as the rock types more likely to contain asbestos. For some sources that would be subject to this ATCM, some dust mitigation measures are currently required for air quality or water quality protection. This proposed measure would promote statewide consistency in control requirements and compliance. The proposed ATCM is expected to apply to only one percent of the new construction in California and 25 of the approximately 800 mines and quarries in California.

2. <u>What does the law require to protect public health?</u>

The TAC Identification and Control Program is established in Health and Safety Code (H&SC) sections 39650 et seq. State law requires the Board to reduce emissions of TACs to the lowest level achievable through the application of best available control technology (BACT) in consideration of cost and risk. The Board may require the use of a more effective control method if it is determined to be necessary to prevent an endangerment of public health. The staff is proposing an ATCM consistent with this State law mandate and believes that the proposed dust mitigation measures are technically feasible and will achieve the greatest reductions in exposure at the lowest cost of any approach identified for these source types.

The law is clear in its intent that emissions of TACs should be controlled to levels that reduce health risks and prevent harm to the public health. The law also states that it may be necessary to take action even when undisputed scientific evidence may not be available to determine the exact nature and extent of risk from a TAC.

3. <u>How is serpentine and ultramafic rock related to asbestos?</u>

Two of the most common varieties of asbestos minerals that are found naturally in many parts of California are chrysotile and tremolite. The most common and abundant type is chrysotile. Tremolite also occurs but is found in much lower quantities than chrysotile. Both of these types of asbestos are found in serpentinite, commonly referred to as serpentine or serpentine rock. Ultramafic rock is the parent igneous rock for serpentinite. Ultramafic rock, other than serpentine, may also contain asbestos. Known areas of serpentine and ultramafic rock can be located on geologic maps under the designation of “ultramafic rock units.” The total land area of the State represented by ultramafic rock units is about 1.4 percent, much of which is located in remote areas of northwestern California (DOC, 2000).

When serpentine or asbestos-containing ultramafic rock is crushed, broken, or otherwise disturbed, the asbestos is released to the air and can present a potential health risk. Asbestos released when asbestos-containing soil or rock is disturbed is commonly referred to as "naturally-occurring" asbestos.

III. PUBLIC OUTREACH

An open public process that involves all parties affected by the proposed ATCM is an important component of all ARB’s actions. Since 1998, ARB has maintained a website to facilitate the dissemination of up-to-date information on the issues and progress of the regulatory process for naturally-occurring asbestos at www.arb.ca.gov/toxics/asbestos.htm. Many useful advisories and informational items are available at this site, which has received an average of about 950 hits per month. The website has also been used to notify interested parties of meetings and make draft versions of the proposed ATCM available to the public.

ARB staff has held five public workshops to discuss the regulatory approach and draft regulatory language. ARB staff has also participated in four other public meetings and has had numerous meetings with individuals and small groups. ARB staff also meets on a regular basis with representatives of 13 state and federal agencies with an interest in regulation of naturally-occurring asbestos. ARB staff have coordinated with the districts through the California Air Pollution Control Officers Association. ARB staff have also met and talked with concerned citizens, especially citizens from the El Dorado County area.

Industry involvement has included several of the major industry associations with an interest in construction, the production of aggregate materials, mining, and timber production. These associations and individual quarry operators and their representatives have participated in the public workshops and have met with staff on an individual basis.

IV. EMISSIONS AND POTENTIAL HEALTH IMPACTS

1. <u>What are the sources of naturally-occurring asbestos?</u>

Sources of naturally-occurring asbestos emissions include unpaved roads, driveways, and other surfaces covered with asbestos-containing serpentine or ultramafic rock; and construction, grading, quarrying, and surface mining activities in serpentine and ultramafic rock areas. The use of asbestos-containing material for surfacing was addressed in the Asbestos Airborne Toxic Control Measure for Surfacing

Applications, which the Board approved in July 2000. This measure prohibits the use of material for surfacing if it has an asbestos content greater than 0.25 percent. This proposal addresses emissions of naturally-occurring asbestos from construction, grading and quarrying activities.

2. How much asbestos is emitted from construction, grading, quarrying, and surface mining?

Quantitative assessments of the asbestos emissions from these activities are difficult to estimate because of the many factors which influence the rate of release of the asbestos fibers and the high degree of variability of each of these factors. These factors include the size of the area being disturbed; the level of soil disturbance; the equipment being used including equipment size, speed, and mode of operation; the asbestos content of the material being disturbed; seasonal variations; and meteorological conditions. However, the ARB and others have done air monitoring in locations near these activities in areas where naturally-occurring asbestos was known to be present and found asbestos in the air at potentially harmful concentrations. It is a well-established fact that these activities result in emissions of fine particulate matter. When asbestos is present in soil and rock, it is reasonable to conclude that asbestos, like other particulate matter, will be emitted during such activities.

3. What are the potential health impacts from asbestos exposures related to construction, grading, quarrying, and surface mining?

Asbestos is classified as a known human and animal carcinogen by state, federal, and international agencies. Inhalation of asbestos fibers has been shown to cause several serious illnesses including lung cancer, mesothelioma, and asbestosis. Asbestos, in six mineral forms, was identified by the ARB as a TAC in 1986 and is included on the United States Environmental Protection Agency's (U.S. EPA's) list of hazardous air pollutants. There has been some debate by members of the scientific community regarding the different cancer potencies of the various forms of asbestos. Tremolite and other amphibole asbestos forms are considered by some to be more potent than chrysotile in inducing mesothelioma; however, the available data does not currently enable State or federal scientists to make a distinction of cancer potency by fiber type. It should be noted that chrysotile appears to be equally potent as all other forms of asbestos in causing lung cancer (DHS, 1986).

The asbestos concentrations measured by air monitoring near construction projects, mines, and quarries represent a wide range of estimated potential risks from zero to over a thousand chances per million. The wide range of risk occurs due to the high variability of several factors influencing the rate of emissions, including the asbestos content of the disturbed material, the magnitude of soil disturbance, the measures being taken to reduce dust emissions, and meteorological conditions. The exposure from some of the sources proposed for regulation tends to be episodic. Because the exposures in some locations may be episodic and not a true annual average concentration, the estimated cancer risks may be overstated. While exact risk numbers are difficult to estimate, health officials agree that asbestos is a known human carcinogen and exposure to it should be minimized.

V. SUMMARY OF THE PROPOSED ATCM

1. What does the proposed ATCM require?

The proposed ATCM is designed to minimize the public's exposure to asbestos by requiring work practices that will minimize dust emissions from activities associated with construction, grading, quarrying and surface mining. The ATCM proposes different requirements for three sectors of the industries covered: construction and grading, road construction and maintenance, and quarrying and surface mining. These requirements apply to projects where the area to be disturbed is in an area specified on maps published by the DOC showing ultramafic rock units or where ultramafic rock, serpentine, or naturally-occurring asbestos is known to occur even if not shown on the maps.

In developing the ATCM, one of our goals was to evaluate current practices being used by these sources to minimize dust emissions. We have designed this proposed ATCM by reviewing the existing regulations and incorporating best management practices into the measure. A number of information sources formed the basis for this proposed regulation. Among them are visits to numerous quarries and construction sites, district dust control rules, district permits for sources subject to dust control rules, asbestos air monitoring data collected over many years, U.S. EPA studies of fugitive dust sources, and the emission factors published in the U.S. EPA Compilation of Air Pollutant Emissions Factors (AP-42). The requirements in the proposed regulation reflect the best dust mitigation measures currently being used on these sources. The adoption of this ATCM will help ensure that sources throughout the State are subject to a consistent set of requirements.

The requirements for construction projects are divided into requirements for projects that disturb one acre or less (small construction projects), and those that disturb more than one acre (large construction projects). The requirements for small construction projects specify wetting the soil area to be disturbed; wetting, covering, or stabilizing storage piles; limiting vehicle speeds to 15 miles per hour (MPH) or less; cleaning equipment before moving it off-site; and cleaning up visible track-out on the paved public road. These requirements would not apply to individuals working on their own property that are less than one acre.

Large construction projects are required to prepare a dust mitigation plan and receive approval from the district prior to start of the project. The plan must specify measures that will be taken to ensure that no visible dust crosses the property line and must address specific topics. The dust mitigation plan must address control of emissions from: track-out, disturbed surface areas, storage piles, on-site vehicle traffic, off-site transport of material, and earthmoving activities. The plan must also address post construction stabilization and air monitoring (if required by the district). Table 1 shows control options for the topics to be addressed in the asbestos dust mitigation plan for large construction projects. Many of these requirements would already be carried out by such projects to minimize nuisance dust complaints and protect water quality.

Table 1. Dust Mitigation Options For Large Construction Projects

Emission Sources	Dust Mitigation Options
Track-out	• Gravel pad • Grizzly • Wheel wash system • Wet sweeping • HEPA filter vacuum
Disturbed surface areas and inactive storage piles	• Apply water • Maintain a crust • Apply dust suppressants or chemical stabilizers • Cover with tarps or vegetative cover • Install wind barriers
Traffic on unpaved on-site roads	• Restrict vehicles to 15 MPH or less • Keep roads adequately wetted • Apply dust suppressants • Cover with non-asbestos gravel
Active storage piles	• Keep wet • Cover with tarps
Earthmoving activities	• Pre-wet to depth of cuts • Suspend grading when winds are high • Apply water
Off-site transport of material	• Ensure trucks are maintained such that no spillage can occur from holes or other openings in cargo compartments • Ensure that loads are wet and tarped or wet and loaded with 6 inches of freeboard
Post-construction disturbed areas	• Establish and maintain a vegetative cover • Cover with at least 3 inches of non-asbestos material • Pave

The requirements for road construction and maintenance include notifying the district before starting the project, wetting the area to be disturbed, restricting traffic speed to 15 MPH or less, and preventing visible track-out on the paved public roadway. Again, many of these projects currently employ measures to control fugitive dust.

Quarries and surface mines must obtain district approval for an asbestos dust mitigation plan that ensures that emissions from processing equipment does not exceed either 10 percent or 15 percent opacity depending on the equipment. Also, the plan must ensure that visible dust does not pass over the property line. In addition to processing controls, the plan must include track-out control, control for on-site public roads, and air monitoring (if required by the district). Table 2 shows control options for the topics to be addressed in the asbestos dust mitigation plan.

Table 2. Dust Mitigation Options for Quarries and Surface Mines

Emission Sources	Dust Mitigation Options
Material handling	• Spraybars on conveyors • Shrouds on drop points • Keep materials wet during excavation, grading, and truck loading
Track-out prevention and removal	• Gravel pad • Grizzly • Wheel wash system • 50 feet of paving • Wet sweeping • HEPA filter vacuum
On-site roads open to the public	• Pave with asphalt or concrete • Treat with a dust suppressant • Cover with non asbestos gravel
On-site traffic	• 15 MPH speed limit • Keep roads wetted
Active stock piles	• Keep wetted
Offsite transport of material	• Ensure trucks are maintained such that no spillage can occur from holes or other openings in cargo compartments • Ensure that loads are wet and tarped or wet and loaded with 6 inches of freeboard
Inactive stockpiles and exposed areas	• Keep wetted • Apply dust palliatives or suppressants • Cover with non-asbestos material

The proposed ATCM also contains sections addressing recordkeeping and reporting, test methods, timelines, and definitions.

2. <u>What exemptions are allowed</u>?

Potentially affected sources can obtain an exemption from the ATCM if a geologic evaluation determines that the area to be disturbed does not contain any serpentine or ultramafic rock. Agricultural operations and timber harvesting activities, except for the construction of roads and buildings, are exempted. Individuals engaged in construction and grading activities on property they own or rent are exempt if the area disturbed is one acre or less. This exemption is provided because staff believes the administrative burden on the local air districts, and the difficulty in enforcing the requirements for work practices on homeowners and renters, makes such an approach unworkable. The ARB plans to pursue an education and outreach program to inform homeowners and renters of the potential for exposure and what they can do to reduce their exposure. An exemption is provided for emergency road construction or repair. Road construction and maintenance activities can obtain an exemption if the activity is more than a mile from any receptor. Sand and gravel operations working from an alluvial deposit can obtain an exemption from the dust mitigation measures for processing equipment if the material being processed is from an alluvial deposit.

3. What are the key unresolved issues?

While ARB staff have been able to resolve the majority of the concerns raised by the industry and concerned citizens, there are some issues on which we have not reached a consensus. Some people believe different types of asbestos should be regulated differently. This would not be consistent with State law and the guidance from the Office of Environmental Health Hazard Assessment on health effects analysis. Some companies fear that the districts will routinely require extensive air monitoring without a reasonable cause. We have been working with the air districts informally on this issue and do not expect the districts to respond in this way. Also, we will provide air monitoring guidance to the districts. Some organizations want to be allowed an exemption if they can demonstrate that there is no asbestos in an ultramafic rock area. We are working with the DOC on this issue to see if criteria and a methodology can be developed to reliably make such a determination. Staff does not believe that the necessary tools and techniques exist that would enable a geologist to make this determination. Additionally, implementing this option could result in significant costs to state and local government agencies, including the ARB and DOC.

VI. IMPACTS OF THE PROPOSED ATCM – HEALTH, ECONOMIC, ENVIRONMENTAL

1. Will the revisions reduce public health risk?

The proposed revisions will minimize health risks associated with the disturbance of asbestos-containing material in construction and grading projects, road construction and maintenance projects, and the excavation and processing of asbestos-containing material in quarries and surface mines. This proposed measure will ensure that best management practices for minimizing dust emissions from these activities are implemented when the soil or rock is disturbed. The proposed regulation will also result in a small reduction in the total emissions of particulate matter statewide. Another potential result of this proposed regulation would be reduced worker exposure.

2. What will the ATCM cost?

The increase in cost for small construction projects at existing homes is estimated to be less than $55 per project. Additional costs for new housing construction are estimated to range from $200 to $500 per lot. Costs may vary depending on dust management practices currently being used. Less than one percent of new housing construction is expected to be located in an area covered by the ATCM.

No significant additional costs to California Department of Transportation (Caltrans) or public works departments for road construction and maintenance are expected because these agencies routinely employ measures to minimize dust emissions during road construction.

There are about 800 mines and quarries in California that hold active permits under the Surface Mining and Reclamation Act. Of these, the staff has identified 25 that may incur costs to comply with the ATCM.

Costs to quarries will vary depending on which activities will need additional control and which options are available to sources. Small mines and quarries, that do not have on-site public roads and do not have roads that exit onto a paved public road, would incur the lowest costs. We estimate these quarries will incur first year costs of $500 to $700 and ongoing costs from $0 to $2,000 per year.

Quarries which must add process control, track-out control, and control for on-site public roads. Those that can not use their own gravel for on-site road control are expected to incur the highest costs. These costs range from $5,500 to $6,800 the first year depending on which of the available options they chose. Ongoing costs could range from $0 to $2,000 per year. These costs are not expected to be a significant burden. However, the ATCM will affect the same three quarry operations located in serpentine or ultramafic rock deposits that were identified as having potentially significant economic impacts from a prohibition of the use of asbestos-containing materials for surfacing (ARB, 2000). Several quarries currently are using effective dust mitigation measures for many of the activities addressed in the proposed regulation.

Overall, the proposed regulation is estimated to cost approximately $3 to $5 million over 5 years or an average of $600,000 to $1 million per year.

3. <u>Are there any significant adverse environmental impacts associated with the proposed revisions?</u>

No significant adverse environmental impacts are expected, with the exception that staff has identified a potential for a very small increase of emissions from diesel-powered water trucks, a small increase in water use, and a small increase in electricity used to pump that additional water.

The ARB is committed to evaluating community impacts of proposed regulations, including environmental justice concerns. Because some communities experience higher exposures to toxic pollutants, it is a priority of the ARB to ensure that full protection is afforded to all Californians. The proposed ATCM is not expected to result in significant negative impacts in any community. The proposed ATCM is designed to reduce emissions of asbestos-laden dust in those geographic areas within ultramafic rock units. The result of the regulation will be reduced exposures to potential asbestos emissions for all communities in these areas, with associated lower potential health risks.

VII. NEXT STEPS

If the proposed ATCM is adopted, the local districts must implement and enforce the ATCM. However, if the district wishes to adopt an alternative regulation, it has 120 days to propose a regulation that is at least as stringent as the ATCM. The alternative regulation must be adopted within six months of the adoption of the ATCM. Sources would need to be in compliance by the date the district implemented and enforced the ATCM or by a compliance date specified in the alternative regulation.

The staff is working with the DOC to develop guidance to assist local air districts and geologists on the appropriate contents of a geologic assessment for facilities or operations in asbestos-containing soils. This guidance can be used for the exemption clause in both the amended ATCM for surfacing applications and this ATCM for construction, grading, quarrying, and surface mining. ARB staff will also be working with the DOC to provide updated maps for critical areas likely to contain naturally-occurring asbestos.

VIII. RECOMMENDATION

The ARB staff recommends that the Board adopt the proposed Asbestos ATCM for Construction, Grading, Quarrying, and Surface Mining Operations. In recognition of the State law requirement for the ATCM to reflect BACT, the staff is proposing provisions that will require the use of best management practices for control of dust from construction, grading, quarrying and surface mining operations with the potential to emit asbestos to the air. Benefits from the proposed ATCM are reduced public exposures to asbestos emissions from activities that disturb the soil surface in areas that are known or likely to contain naturally-occurring asbestos. Exposure to asbestos is known to cause lung cancer and mesothelioma. The proposed actions to minimize the public's exposure to this known carcinogen are consistent with State policy to control TACs to the lowest level achievable to prevent endangerment to public health.

I. INTRODUCTION

Exposure and disturbance of rock that contains asbestos can result in the release of fibers to the air and consequent exposure to the public. Asbestos most commonly occurs in ultramafic rock that has undergone partial or complete alteration to serpentine rock (proper rock name serpentinite). Serpentine rock is abundant in certain areas of California and often contains chrysotile asbestos. In addition, another form of asbestos, tremolite, can be found associated with ultramafic rock, particularly near faults. Sources of asbestos emissions include: unpaved roads or driveways surfaced with ultramafic rock, construction activities in ultramafic rock deposits, or rock quarrying activities where ultramafic rock is present. In 2000, the Air Resources Board (ARB or Board) strengthened a regulation that was adopted in 1990 to reduce exposure to asbestos from surfacing applications.

Asbestos was identified by the ARB as a toxic air contaminant (TAC) in 1986 and is a known human carcinogen. A TAC is an air pollutant that may cause or contribute to an increase in mortality or an increase in serious illness, or which may pose a present or potential hazard to human health. As part of this identification, the Board determined that there is no identifiable threshold exposure level below which no significant adverse health effects are anticipated. Under California Health and Safety Code (H&SC) section 39666, the Board has the responsibility of reducing emissions of toxic air contaminants with no identified threshold exposure level to the lowest level achievable. This is done through the application of the best available control technology or a more effective control method, unless the Board determines that an alternative level of emission reduction is adequate or necessary to prevent an endangerment of public health. In making this determination, the Board must consider potential alternatives to the proposed control measure.

When the first Asbestos Air Toxic Control Measure (ATCM) was adopted in 1990, the Board directed the staff (Resolution 90-27, 1990) to return to the Board if they found that further control of emissions from serpentine material on existing surfaces was necessary. Since the adoption of the first Asbestos ATCM, additional information from ambient monitoring studies and modeling has been developed. This new information demonstrates that there are significant potential exposures and risks associated with unpaved roads, even when the asbestos content of the road material is less than one percent, and with construction and quarrying activities in areas with ultramafic rock (ARB, 2000).

Last year the Board approved amendments to the 1990 Asbestos ATCM that reduced the allowable asbestos content in materials used for surfacing applications from five percent to 0.25 percent. At that time we advised the Board that we would be returning with a complementary ATCM addressing asbestos emissions from construction, grading, and quarrying. ARB staff is now proposing adoption of an Asbestos ATCM for Construction, Grading, Quarrying, and Surface Mining Operations. This proposed regulation is the result of the ARB staff's evaluation of the need for regulation of construction, grading, quarrying, and surface mining in areas of naturally-occurring asbestos. This report contains a discussion of that evaluation and staff's recommendations for reducing public exposure to naturally-occurring asbestos from those source categories.

The ARB staff proposes to adopt an Asbestos ATCM for Construction, Grading, Quarrying, and Surface Mining Operations. This proposed control measure would require persons proposing to disturb deposits of naturally-occurring asbestos to implement measures that will minimize the emissions of dust from these operations. The proposed ATCM would also require certain operations to get approval from the local Air Pollution Control or Air Quality Management District (district) of an asbestos dust mitigation plan. Other operations will be required to notify the local district when they will be disturbing areas where naturally-occurring asbestos is found or is likely to be found.

If adopted by the Board, the proposed ATCM will be sent to the districts to be implemented and enforced as required under H&SC section 39666. The local districts may implement the proposed ATCM, as approved by the Board, or adopt an alternative rule that is at least as stringent as the ATCM.

II. BACKGROUND

A. Naturally-Occurring Asbestos in Serpentine and Ultramafic Rock

(ARB, 2000)

The term asbestos refers to a group of fibrous, inorganic minerals that are commercially valued for their high tensile strength and resistance to heat. Asbestos minerals belong to either the serpentine mineral group or the amphibole mineral group. The predominant asbestos types in California are chrysotile, tremolite, and actinolite.

The host rock for chrysotile asbestos is serpentinite (hereafter referred to as serpentine or serpentine rock). Serpentine is widely distributed in California. It is mostly derived from the ultramafic rock, peridotite. Serpentine usually occurs near major faults or within fault zones. Chrysotile asbestos veins can be found in many of the serpentine masses in California. (DOC, 2000)

Ultramafic rocks are those igneous rocks composed mainly of the iron-magnesium silicate minerals. They include the rock types dunite, peridotite, and pyroxenite. Metamorphism of ultramafic rocks usually results in the formation of the rock serpentine. Because metamorphism of ultramafic rocks to produce serpentine normally proceeds in successive steps rather than all at once, many ultramafic rocks will only be partially converted to serpentine when they are finally exposed at the surface of the earth.

Asbestos may form at any time during the conversion of ultramafic rocks to serpentine if the physical and chemical conditions are right. Consequently, depending on its metamorphic history, serpentine may contain chrysotile asbestos, tremolite-actinolite asbestos, or both. A black and white copy of the State map showing identified locations of deposits of ultramafic rock units in California can be found in Appendix B. A color copy can be found on the Department of Conservation (DOC), Division of Mines and Geology's (DMG) website at *www.consrv.ca.gov/dmg/minerals/ultramafic/index.htm* under the heading *DMG Open-File Report 2000-19: A General Location Guide for Ultramafic Rocks in California - Areas More Likely to Contain Naturally Occurring Asbestos*. (DOC, 2000a)

Tremolite and actinolite asbestos are the most common amphibole mineral group asbestos types in Califormia. Tremolite asbestos has been found in most of the counties of the Sierra Nevada and the Klamath Mountains. It generally occurs in veins associated with fault or shear zones in serpentine. Such veins are ordinarily no more than a few inches wide, but some contain pockets several feet wide and maximum lengths on the order of 50 to 110 feet (DOC, 2000). Tremolite and actinolite asbestos also occurs along serpentine contacts with other metamorphic rocks (rocks that have been transformed from their original state due to temperature, pressure, and chemical environment). (DOC, 2000a)

In addition to serpentine, other rock types in California with documented occurrences of tremolite or actinolite asbestos are carbonates (limestone, dolomite and marble), metamorphic rocks such as certain kinds of schist (a type of crystalline rock), and in certain kinds of igneous rock. However, the number of documented occurrences of tremolite or actinolite asbestos is much lower for these other rock types than for serpentine. The most favorable areas for asbestos occurrences within these non-serpentine rock types are along faults or within fault zones that traverse them. (DOC, 2000a)

Table II-1 lists the 42 counties in California that are known to have serpentine and ultramafic rock. The total land area of the State of California represented by these deposits is about 1.4 percent. The majority of these deposits are in remote regions of Northwestern California. In addition to the counties in Table II-1, Riverside and Inyo counties have small serpentine and asbestos deposits related to localized metamorphism of certain carbonate rocks. (DOC, 2000)

Table II-1. Counties with Serpentine and Ultramafic Rock that May Contain Asbestos

Alameda	Imperial	Nevada	Siskiyou
Amador	Kern	Placer	Sonoma
Butte	Kings	Plumas	Stanislaus
Calaveras	Lake	San Benito	Tehama
Colusa	Los Angeles	San Francisco	Trinity
Contra Costa	Marin	San Luis Obispo	Tuolumne
Del Norte	Mariposa	San Mateo	Tulare
El Dorado	Mendocino	Santa Barbara	Yolo
Fresno	Merced	Santa Clara	Yuba
Glenn	Monterey	Shasta	
Humbolt	Napa	Sierra	

Source: DOC, 2000.

The occurrence of asbestos varies with different rock types and geologic conditions. In general, the vast majority of serpentine rock potentially contains asbestos. However, the occurrence of asbestos in ultramafic rock is variable. Ultramafic rock, especially in and around earthquake faults, has a higher probability of containing asbestos. Other forms of rock that have been identified as having a small potential for containing asbestos includes gabbroic rocks (in special cases) and dolomitic limestone near igneous rock intrusions.

Asbestos fibers can be released into the ambient air when serpentine or asbestos-containing ultramafic rock is disturbed, crushed, or worn down by human activities or by the natural forces of weathering.

B. Identification of Asbestos as a Toxic Air Contaminant (ARB, 2000)

In March 1986, the Air Resources Board (ARB/Board) identified asbestos in accordance with Health and Safety Code (H&SC) section 39650, et seq. as a toxic air contaminant (TAC). The Board identified the following mineral forms of asbestos as a TAC: chrysotile, actinolite, amosite, anthophyllite, crocidolite, and tremolite. The Board concluded there was not sufficient scientific evidence available to identify a threshold exposure level for asbestos below which no significant adverse health effects are anticipated (title 17, California Code of Regulations, section 93000). The United States Environmental Protection Agency (U.S. EPA) has also listed asbestos, in all its forms, as a hazardous air pollutant pursuant to section 112 of the federal Clean Air Act.

There has been debate by some members of the scientific community on whether there are different cancer potencies for the various forms of asbestos. Some believe the chrysotile form of asbestos is a less potent carcinogen for mesothelioma than other forms of asbestos, such as tremolite. However, no distinction in cancer potencies between the various asbestos forms has been made by either the ARB or U.S. EPA due to the lack of conclusive scientific data. Both agencies currently treat all forms of asbestos to be equally hazardous. This issue is further discussed in the following section.

C. Health Effects of Asbestos

(ARB, 2000)

Asbestos is classified as a known human and animal carcinogen by state, federal, and international agencies. When asbestos fibers are inhaled they are deposited deep into the lung and may be retained there for long periods. The fibers can cause inflammation of body tissue and can disrupt cell division leading to various diseases. These diseases may not occur until many years after exposure, even after the exposure has ended. Inhalation of asbestos fibers has been shown to cause several serious illnesses including lung cancer, mesothelioma, and asbestosis.

Lung Cancer: Lung cancer is a relatively common form of cancer which has been linked to smoking, asbestos exposure, and a variety of occupational exposures. Cigarette smoking significantly increases the risk of lung cancer for those people exposed to asbestos.

Mesothelioma: Mesothelioma is a rare, incurable cancer of the thin membranes lining the lungs, chest, and abdominal cavity. Almost all cases are linked to prior occupational asbestos exposure. However, mesothelioma, from environmental exposure to tremolite, has been found in people living in Greece, Turkey, and New Caledonia.

Asbestosis: Asbestosis (a form of pulmonary fibrosis) is a non-cancerous lung disease related to diffuse fibrous scarring of the lungs. Inhaling asbestos fibers can cause scar tissue (fibrosis) to form inside the lung. This scarring of the lung tissues reduces the lung’s ability to expand and contract, thereby reducing the uptake of oxygen and impeding respiration. Asbestosis can cause progressive shortness of breath and coughing. This disease has occurred in people heavily exposed to asbestos in the workplace and in the families of asbestos workers.

Ingestion of asbestos fibers can occur by drinking water that contains asbestos fibers. It also can occur when inhaled asbestos fibers are coughed up and swallowed. Ingestion of asbestos fibers has not been consistently linked to cancer or any other adverse health effects.

As part of the identification of asbestos as a TAC, the California Department of Health Services (DHS) staff (now part of California Environmental Protection Agency's Office of Environmental Health Hazard Assessment [OEHHA]) was responsible for evaluating the health effects that may result from exposure to asbestos. A report on the health effects of asbestos was published at that time and is referred to here for additional detailed information regarding health effects (*Staff Report for the Identification of Asbestos as a Toxic Air Contaminant Part B - Health Effects, DHS 1986*).

At the time of identification OEHHA staff developed a range of cancer unit risk factors, also referred to as potency values, for lung cancer and mesothelioma. A cancer unit risk factor is the estimated probability of contracting cancer as a result of constant long-term exposure to a given concentration of a substance. The cancer unit risk factors that were developed differ by gender and smoking status. All cancer unit risk factors developed by OEHHA are reviewed and approved by the Scientific Review Panel on Toxic Air Contaminants (SRP). The SRP is an independent group of scientists established by H&SC section 39670 appointed to advise the ARB on the health effects and toxicity of substances. Both the lung cancer and mesothelioma unit risk factors recommended for use by OEHHA are presented below in Table II-2. For specific details on the development of the cancer unit risk factors, please refer to the identification report referenced above.

Table II-2. Cancer Potency Values for Lung Cancer and Mesothelioma Due to Continuous Exposure to Asbestos [1]

(Expressed as potential cancer cases per million people exposed)

Cancer Type	Exposure Group	Potency Value[2]
Lung	Male smoker	110
Mesothelioma	Female nonsmoker	190

1. 0.0001 asbestos fibers (determined by phase contrast microscopy) per cubic centimeter of air
2. Scientific Review Panel approved cancer potency value

The OEHHA staff has reviewed several health studies that were published subsequent to the ARB's 1986 identification of asbestos as a TAC. These reviews were prompted by assertions that these health studies indicate that tremolite and other amphibole asbestiforms are more carcinogenic for inducing mesothelioma than chrysotile. In 1990, the ARB requested that the SRP review the issues surrounding these assertions. The SRP, after reviewing these health studies, found that the data submitted did not warrant a change to the risk assessment. (Aldrich, 1990)

While tremolite and other amphibole asbestos forms are considered by some scientists to be more potent than chrysotile in inducing mesothelioma, the available data do not allow quantification of potency by fiber type. It should be noted that chrysotile appears to be equally potent as all other forms of asbestos in causing lung cancer. The risk of contracting a disease from asbestos exposure is related to the cumulative inhaled dose, and increases with the time from initial exposure. Many factors may influence the disease-causing potency of any asbestos forms, such as fiber length and width and fiber type. Most health officials agree that all forms of asbestos must be considered to pose a carcinogenic risk, and that exposure to all of the forms of asbestos should be minimized.

D. Other Asbestos Regulations

Asbestos emissions in California are regulated on the federal, state, and local levels. Through its program for hazardous air pollutants, the U.S. EPA promulgated regulations for asbestos milling activities, the manufacture of asbestos products, demolition and renovation activities, and waste-disposal operations. Both California and federal regulations exist covering the transport of asbestos and asbestos-containing waste material. The U.S. EPA has also promulgated the Asbestos Hazardous Emergency Response Act (AHERA), which provides a framework for dealing with asbestos in schools. In 1990, the U.S. EPA adopted a ban on most of the remaining uses of asbestos in commercial products. The federal Occupational Safety and Health Administration (OSHA) and the Mine Safety and Health Administration (MSHA) regulate workplace practices and set maximum asbestos exposure levels for workers. In 2000, the U.S. EPA extended occupational standards of OSHA to cover state and local government employees and employees of the public schools. Also, the federal Consumer Product Safety Commission regulates the use of asbestos in consumer products (ARB, 2000).

California has an air toxic control measure (ATCM) restricting the use of ultramafic rock or serpentine rock for surfaces (title 17, CCR, section 93106). Additionally, there are other state and local government regulations covering naturally-occurring asbestos.

1. National Emissions Standards for Hazardous Air Pollutants

In 1973, asbestos was included as a hazardous air pollutant under the National Emissions Standards for Hazardous Air Pollutant (NESHAP) regulations. The Asbestos NESHAP was intended to minimize the release of asbestos fibers during activities involving commercial handling of asbestos. The commercial sources covered by the asbestos NESHAP are as follows:

- Asbestos Mills
- Asbestos Mine Tailings for Roadways
- Manufacturing asbestos products
- Demolition and renovation
- Spraying asbestos

- Fabricating
- Insulating materials
- Waste Disposal
- Active and Inactive Waste Disposal Sites

None of these sources cover construction, grading, surface mining, or quarrying. A situation similar to construction activities in an area of naturally-occurring asbestos occurred in Minnesota. A construction site was found to have asbestos layered and intermixed in the soil. The asbestos material was determined to be from a building demolition project occurring before the NESHAP regulation was promulgated. The Minnesota Pollution Control Agency used NESHAP requirements for remediation of the site.

The NESHAP requires that there be no visible emissions, that the asbestos-containing material must be adequately wet, and specifies packaging, transport, and disposal procedures. Only asbestos-containing material with an asbestos content greater than one percent is covered by these regulations. Recordkeeping and training are also required.

2. <u>National Pollutant Discharge Elimination System</u>

The U.S. EPA has promulgated a National Pollutant Discharge Elimination System (NPDES) storm water program (Phase I); 40 C.F.R. Part 122, 123, 124 to address water discharges from industrial, municipal, and construction activities. Quarries and surface mines are covered under the Industrial section of the NPDES regulation. The Construction section covers construction sites that disturb five acres or more. NPDES provides that discharges of storm water to waters of the United States from industrial, municipal, and construction projects are effectively prohibited unless the discharge is in compliance with a state issued NPDES permit. The NPDES permit requires all industrial, municipal, and construction dischargers to develop and implement a Storm Water Pollution Prevention Plan which specifies Best Management Practices (BMPs) that will prevent all pollutants (including soil) from contacting storm water with the intent of keeping all products of (wind and water) erosion from moving off-site into receiving waters. Phase II of NPDES (40 CFR Part 122, Subpart B, Section 122.26 et seq.) goes into affect March 10, 2003. Phase II reduces the size of the covered construction activity to one acre. Both Phases of NPDES require BMPs for fugitive dust emissions and track-out control. However, the BMPs do not require that no visible dust leave the property and they allow dry sweeping of track-out areas. The proposed Asbestos ATCM is more stringent in that it requires that no visible dust leave the property and does not allow dry sweeping in any situation.

NPDES recognizes asbestos as a toxic pollutant and as a hazardous substance. However, NPDES is concerned with storm water discharges of toxic pollutants and hazardous substances into U.S. waterways. While the NPDES regulation has some ancillary benefits for air quality, it is primarily directed toward water quality. NPDES does not provide the air quality protection that will be provided by the proposed ATCM.

3. Asbestos Hazard Emergency Response Act

The AHERA was enacted in 1986 to address asbestos hazards in schools. The goal of AHERA was to protect students from friable asbestos-containing building materials. The AHERA regulations cover inspection, appropriate response actions, and periodic surveillance of asbestos-containing building materials used in schools. U.S. EPA interpreted that AHERA did not include non-building asbestos products. AHERA did not address the situation of a school being built on soil containing naturally-occurring asbestos or a school maintenance worker using asbestos gloves.

The AHERA requirements are identical to demolition and renovations requirements in the Asbestos NESHAP.

4. Toxic Substances Control Act

The Toxic Substances Control Act (TSCA) of 1976 was enacted by Congress to give U.S. EPA the ability to track the 75,000 industrial chemicals currently produced or imported into the United States. One of these substances is asbestos. U.S. EPA repeatedly screens these chemicals and can require reporting or testing of those that may pose an environmental or human-health hazard. U.S. EPA can ban the manufacture and import of those chemicals that pose an unreasonable risk. U.S. EPA used TSCA in 1989 to ban the use of asbestos in manufactured commercial products. Most of this ban was vacated by the United States 5th Circuit Court of Appeals in 1991 and the rule was remanded to the U.S. EPA. The U.S. EPA has not yet re-issued this rule.

5. Vehicle Code

Federal and California vehicle codes cover the transportation of hazardous substances and hazardous waste. The definition of hazardous substances is lengthy and contained in the California Vehicle Code Section 2452 and title 49 section 172.101 of the Code of Federal Regulations. Asbestos is classified as a hazardous substance. However, these aforementioned sections exempt asbestos contained in mineral ore. Therefore, serpentine and ultramafic rock containing naturally-occurring asbestos is not covered by state or federal regulations. There are general requirements on hauling of soil and aggregate. These general requirements do not prevent asbestos-containing dust from being blown from a transport loaded with serpentine or ultramafic rock aggregate. The California Vehicle Code has additional regulations on spillage on highways. This regulation requires loads to be covered during transport. However, aggregate is exempt as long as the load is six inches below the top of the side of the truck. Dust from aggregate is not covered under this section of the California Vehicle Code.

6. Occupational Safety and Health Administration (U.S. Department of Labor)

The purpose of OSHA is to save lives, prevent workplace injuries and illnesses, and protect the health of all America's workers. OSHA has regulations covering asbestos exposure in general industry and construction. These regulations set standards for a maximum exposure limit and include provisions for engineering controls and respirators, protective clothing, exposure monitoring, hygiene facilities and practices, warning signs, labeling, record keeping, and medical exams.

The OSHA has a time-weighted permissible exposure limit and an excursion limit standard. The time-weighted average (averaged over an 8-hour period) permissible exposure limit is set at 0.1 fibers per cubic centimeter (f/cc). An excursion limit, averaged over a 30-minute period, is set at 1.0 f/cc. Both of these standards are called permissible exposure limits or PEL's.

7. Asbestos Worker Protection

The U.S. EPA promulgated the Asbestos Worker Protection Regulation (AWPR) to protect state, local government, and public education employees from the health risks of exposure to asbestos to the same extent as private sector workers. The AWPR asbestos standards are set at the same level as the asbestos standards of OSHA. The AWPR covers employees who are performing construction work, custodial work, and automotive brake and clutch repair work.

8. Mine Safety and Health Administration

The MSHA administers the provisions of the Federal Mine Safety and Health Act of 1977 and enforces compliance with mandatory safety and health standards. MSHA has notified mine operators that they must ensure that asbestos-containing ore or rock is identified and measures are in place to protect miners from overexposure to asbestos-containing dust. MSHA requires operators to determine if the rock or ore contains asbestos. If it does, operators are to have a plan in place to ensure that miners are protected from dust containing asbestos. Miners cannot be exposed to more than two fibers per cubic centimeter of air for an eight-hour work shift. This is twice the exposure allowed by OSHA.

9. State Asbestos Regulations

State regulations on asbestos are related to demolition and renovations, and waste disposal of asbestos-containing material. Only California has a statewide regulation covering naturally-occurring asbestos. The Asbestos ATCM for Asbestos-Containing Serpentine, adopted in 1990, prohibited the use of serpentine aggregate for surfacing if the asbestos content was five percent or more asbestos. This ATCM was modified in July 2000 to include ultramafic rock and the asbestos content threshold was lowered to 0.25 percent. The modified asbestos ATCM will go into effect in the summer of 2001.

10. California County Asbestos Regulations

Several counties in California have adopted more stringent regulations for aggregate used for surfacing. Placer County and Mariposa County ban the use of asbestos-containing aggregate for surfacing.

El Dorado County has a Naturally-Occurring Asbestos & Dust Protection Ordinance. The ordinance requires an asbestos hazard dust mitigation plan. The plan requires practices to be followed to eliminate the emission of fugitive dust from grading, excavation, and construction activities. The County can require additional mitigation and air monitoring if necessary to protect and/or demonstrate the protection of public health and safety.

11. Lake County Air Quality Management District

The Lake County Air Quality Management District adopted a regulation for aggregate use that restricts serpentine aggregate used for surfacing to one percent. This regulation also regulates construction in serpentine outcrops or alluvial material from a serpentine outcrop if it has a greater that one percent asbestos content. Construction projects having a potential to create a wearing surface must file and obtain approval for an asbestos-dust-hazard mitigation plan. It also requires that no dust from the operation exceed five percent opacity 20 feet from the traveled surface. Plans are also required for any unpaved road, parking lot, or recreational trail intended for motor vehicle use that is: greater than 260 linear feet or 160 square feet if it is located in areas having residential, industrial, or commercial zoning; or has a building density greater than two units per acre or areas within 200 feet of the source which are regularly inhabited by five or more persons.

12. Fairfax County, Virginia

Fairfax County, Virginia has areas that have soil containing naturally-occurring actinolite/tremolite asbestos. Fairfax County has regulations involving construction activities in these areas. The County requires a written compliance plan prior to commencement of work on construction projects. This plan includes notification of all subcontractors. The plan must detail an air-monitoring program to be conducted during all phases of the manipulation of the actinolite/tremolite containing soil. The County regulation prohibits discharge into the atmosphere, from any construction activity, of any emissions of asbestos in such quantities as to cause or contribute to a 24-hour average public exposure in excess of 0.020 fibers per cubic centimeter of air. Effective dust control must be practiced at all times. The NESHAP's adequately wet provisions apply.

The disposal of actinolite/tremolite containing soils must be addressed in the compliance plan and the soils deposited in a pre-approved disposal site. The recipient of these soils must be notified in writing that the material contains actinolite/tremolite minerals and may contain asbestos. Contaminated material, including soil, removed from the site cannot be considered clean fill. Contaminated material must be sufficiently wet and transported in covered trucks, meeting federal hazardous waste transport regulations. All finished grades of the developed land must be covered with six (6) inches of clean compactible material.

III. PUBLIC OUTREACH

An open public process that involves all parties affected by the proposed air toxic control measure (ATCM) is an important component of all of the Air Resources Board's (ARB/Board) actions. The ARB established a website in 1998 to make information readily-available to the public regarding asbestos. Since the website has been established, it has received an average of about 950 monthly hits. The website is available at www.arb.ca.gov/toxics/asbestos.htm.

Originally, the ARB staff intended to address construction, grading, quarrying, and surface mining in conjunction with the revisions to the 1990 Asbestos ATCM for surfacing applications. Consequently, the first part of the public outreach effort for this proposed measure was carried out in conjunction with the outreach for the revisions to the previous asbestos ATCM. Prior to the separation of the measures, the ARB held two public workshops to discuss the proposed approaches and draft regulatory language. Since then, the ARB staff has held three more public workshops. In addition, staff has been involved in numerous contacts with the public, other government agencies, and industry on an ongoing basis.

ARB staff has compiled the relevant comments received from the districts, affected sources, and the public during the development of the proposed ATCM. These comments are available for public review and comment upon request to the Stationary Source Division at (916) 323-4327.

A. General Public Involvement

In March 1998, the Sacramento Bee newspaper ran a series of articles concerning the potential health risk to persons in El Dorado County from naturally-occurring asbestos. The articles raised public awareness and as a result of the articles numerous persons contacted the ARB. The public has been very involved with the issues related to naturally-occurring asbestos and has been engaged with the ARB on a regular basis to discuss issues and actions to be taken. A summary of the public involvement includes:

- Hundreds of telephone conversations with various members of the public
- Public forums to present information and answer questions
  - June 8, 1998, public meeting of the Asbestos Task Force (see next page for description)
  - September 2, 1999, Grange Hall meeting in Garden Valley, California
  - October 4, 1999, pubic meeting in Forresthill, California
  - November 16, 1999, public workshop in Sacramento, California
  - February 2, 2000, public workshop in Sacramento, California
  - March 4, 2000, public tour and meeting in El Dorado County
  - November 28, 2000, public workshop in Sacramento, California
  - March 12, 2001, public workshop in Sacramento, California
  - May 15, 2001, public workshop in Sacramento, California
- Numerous individual and small group meetings at the request of the public

In December 1999, the ARB also released a school advisory which warns school officials of the possible health impacts from the use of materials containing naturally-occurring asbestos. This advisory, which was developed with the participation of the California Department of Education staff, was sent to over 1,300 school officials statewide.

B. Government Agency Involvement

In April 1998, the California Environmental Protection Agency offered assistance to El Dorado County officials in response to the public's concerns raised by the series of articles in the Sacramento Bee Newspaper regarding naturally-occurring asbestos. To address these needs, the Asbestos Task Force was formed including representatives from the offices of Assemblyman Tim Leslie (formerly Senator) and Senator Rico Oller (formerly Assemblyman), and the El Dorado County Air Pollution Control District and Board of Supervisors. Several State agencies also participated including the ARB, the Office of Environmental Health Hazard Assessment (OEHHA), the Department of Health Services, the Department of Toxic Substances Control, and the Department of Conservation (DOC), Division of Mines and Geology. Additional members included representatives from the United States Geological Survey and the Geology Department of the University of California at Davis. The Task Force was disbanded after the release of *The Findings and Recommendations* report in March 1999.

The Task Force and ARB made several informational items available to the public regarding asbestos, many of which are also available on ARB’s website. These items included:

- A White Paper: entitled “*Naturally-Occurring Asbestos in El Dorado County*”
- A Report *of Findings and Recommendations to El Dorado County*
- A Series of Fact Sheets
    - Naturally-Occurring Asbestos: General Information
    - Health Information on Asbestos
    - School Advisory for Naturally-Occurring Asbestos
    - Ways to Control Naturally-Occurring Asbestos Dust
    - Naturally-Occurring Asbestos Around Your Home
    - Monitoring for Asbestos
- A Health Provider Education Fact Sheet
- A telephone Hot Line: 1-800-CLEANUP (253-2687).

After the Task Force disbanded, several federal, state, and local agencies continued, and still continue, to meet on a regular basis to address ongoing asbestos issues. The agencies represented include:

- California Attorney General's Office
- California Department of Transportation
- California Environmental Protection Agency
- California Occupational Safety and Health Administration
- Department of Conservation, Division of Mines and Geology

- Department of Education
- Department of Health Services
- Department of Real Estate
- Department of Toxic Substance Control
- El Dorado County Air Pollution Control District
- Office of Environmental Health Hazard Assessment
- Office of Planning and Research
- United States Environmental Protection Agency

ARB staff has maintained ongoing communication with the affected Air Pollution Control and Air Quality Management Districts (districts) throughout the development of this regulation. Most recently, on March 30, 2001, ARB staff addressed the mid-spring Rural California Air Pollution Control Officers Association section meeting in Colusa, California. At this meeting, the staff presented an overview and update of the draft revised ATCM for the Air Pollution Control Officers of several potentially affected districts.

C. Industry Involvement

Industry involvement in the process has included the participation of several of the major associations in the State with an interest in construction and the production of aggregate materials and mining. These associations include: the California Mining Association, the Construction Materials Association of California, the Associated General Contractors of California, the Southern California Rock Products Association and Southern California Ready Mixed Concrete Association, the Sacramento Area Geologists and Engineers, and the California Building Industry Association. Representatives from these associations have participated during workshops and have met with staff on an individual basis. In addition, landfill operators, quarry operators, contractors, and their representatives have participated in the public workshops.

Through discussions with industry organizations, other governmental agencies, and concerned citizens, a number of issues were raised and resolved. In many of these cases we were able to modify the proposed regulation to address the issues and concerns raised. For example, we modified the definition of adequately wet. The revised definition includes the option to demonstrate the effectiveness of a moisture content for a specific material. That moisture content and the applicable test method would then be specified in the district-approved asbestos dust mitigation plan. While we were able to resolve the majority of the concerns raised by the industry, there are a few issues on which we have not reached a consensus. We are continuing to work with all interested parties on these issues.

D. Issues

Some industry sources want to be allowed an exemption if a geologic evaluation shows that there is no asbestos in material that is identified as ultramafic rock. The relationship of ultramafic rock to asbestos is that, unlike most all other rock types, ultramafic rock contains the mineral composition that is likely to produce asbestos under the right conditions. According to informal discussions to date with staff of the DOC, predicting whether those conditions will be met somewhere in an ultramafic rock body is very difficult. It is unlikely that a geologist would be able to state with a relatively high level of certainty that asbestos does not exist somewhere in the rock body. Staff does not believe that the tools and techniques currently exist that would enable a geologist to make this determination. However, we are continuing to seek the advice of DOC staff on this issue. Additionally, implementing this option could result in significant costs to state and local government agencies. Finally, providing an exemption may not be practical given the low cost associated with implementing the dust mitigation requirements of the proposed regulation.

There is concern on the part of the industry that air districts will require extensive and expensive air monitoring without a reasonable cause. While the cost of air monitoring for an extended period of time could exceed the cost of the dust mitigation measures, staff does not believe the air districts will require extensive air monitoring. The air districts' interest in air monitoring is the demonstration that the dust mitigation measures were adequate where innovative approaches were being tried, where the site was near sensitive receptors, or if there were numerous complaints or evidence of off-site dust transfer. Another reason the districts may require monitoring is if the owner/operator has a pattern of non-compliance.

Some industry representatives suggest that the regulation should contain different requirements for different types of naturally-occurring asbestos. The proposed regulation is based on the evaluation of the health effects of asbestos done by OEHHA and reviewed by the Scientific Review Panel. This health effects analysis indicated that we should consider all types of asbestos as equally toxic and that exposure to asbestos fibers could result in adverse health effects regardless of their length. We believe the staff proposal is consistent with State law in that it minimizes emissions of, and exposure to, all naturally-occurring asbestos fibers through application of best available control technology.

IV. EMISSIONS, POTENTIAL EXPOSURES, AND RISK

This chapter presents information showing that construction, grading, quarrying, and surface mining activities can result in significant emissions of particulate matter. Particulate matter emissions can contain varying amounts of asbestos, depending upon a variety of factors, such as the amount of naturally-occurring asbestos in the native rock or soil. Naturally-occurring asbestos is easily broken down into very small fibers that become airborne when disturbed. Information showing that asbestos has been found in air samples collected near construction, grading, quarrying, and surface mining sites located in areas where naturally-occurring asbestos occurs is also included in this chapter. This information confirms public exposure to airborne asbestos from these activities.

The estimated potential risks for lung cancer and mesothelioma are also included for some of the asbestos concentrations measured in the air sampling studies. The estimated cancer risks are developed by applying an approved potency value, or unit risk factor, to the measured ambient asbestos concentration. The estimated risks assume that a person would be continuously breathing the measured airborne asbestos levels for 24 hours a day for 70 years, which is a standard risk assessment assumption. The estimates should not be considered as absolute certainties, but are provided to show the upper-most chances of developing cancer, and serve as a measure of relative risk which may be used to compare to other environmental exposures.

Construction, grading, quarrying, and surface mining activities result in emissions of fine particulate matter. Fine particulate matter is particulate matter with an aerodynamic diameter less than 10 micrometers (µm or micron) (PM_{10}). PM_{10} remains airborne for long periods and is more likely to be inhaled than larger particles. Particulate matter emissions result from a variety of activities associated with construction, grading, quarrying, and surface mining and are influenced by numerous site-related and equipment-related factors. Particulate matter emissions from a specific site will depend on many factors including the type of equipment used, the level of activity, the moisture and silt content of the soil or bulk material, meteorological conditions, and what mitigation measures are used.

When asbestos is present in soil and rock that is being disturbed by construction, grading, quarrying, or surface mining, asbestos will be emitted along with the other particulate matter. To estimate asbestos emissions, we are assuming that the fraction of asbestos in the particulate matter emissions will be the same as the fraction of asbestos in the soil or bulk material being crushed, graded, driven on, or excavated. This assumption may underestimate actual exposure because of the nature of asbestos and the physical characteristics of the emission sources. Asbestos is a fibrous crystalline form of the asbestos parent materials. The non-asbestiform materials are harder (more resistant to fracturing) than the asbestiform materials. Therefore, the asbestiform fraction would be more prone to fragmentation and release than the harder, non-asbestiform portions of the material. Due to the variety of factors affecting the potential emission rate, such as moisture content, wind speed, amount of equipment activity, emissions are difficult to predict.

A. Estimated Particulate Matter and Asbestos Emissions from Construction Sites

Operations at construction sites can be divided into several phases including site preparation, excavation, ground preparation, structure construction, and landscaping. It is during these phases that activities such as back filling, grading, and leveling have the potential to contribute to particulate matter emissions, and, therefore, potential emissions of asbestos. Depending on the topography of the site, any of several types of mobile power equipment may be needed to prepare the land for construction. Some of the more popular pieces of equipment used are scrapers, loaders, excavators, and bulldozers.

Another source of particulate matter emissions from a construction site is track-out. Mud and dirt carried-out from construction sites on the wheels of vehicles leaving a site can sometimes result in a significant amount of material deposited on to nearby paved roads. Vehicle traffic causes the material to become airborne. Based on staff observations, track-out is a widespread problem.

Field investigations have shown that the amount of particulate matter emitted by construction equipment depends on several parameters including vehicle speed, vehicle weight, number of wheels per vehicle, the surface silt content, the area surface and texture, and surface moisture content. Also, field investigation has shown that the amount of particulate matter emissions increases linearly with the amount of traffic over the surface. The unpaved surface at a construction site is similar to an unpaved road. Therefore, we can use the formula from the U.S. Environmental Protection Agency Compilation of Air Pollutant Emissions Factors (AP-42) (which was developed to estimate emissions from unpaved roads) to estimate particulate matter emitted during construction activities (U.S. EPA, 1988; Cowherd et al., 1990). This formula is shown as Equation 1.

Equation 1 can be used to estimate particulate matter emissions from construction equipment based on vehicle-specific and site-specific parameters. It should be noted that test data shows that actual emissions can be more than two times what the equation predicts (DRI, 1996), which is not surprising considering the variety of equipment and variability in wind direction and speed. However, Equation 1 illustrates the relationship of the factors that affect the magnitude of emissions.

(1)

$$e = 0.61\left(\frac{s}{12}\right)\left(\frac{S}{48}\right)\left(\frac{W}{2.7}\right)^{0.7}\left(\frac{w}{4}\right)^{0.5}\left[\frac{(365-p)}{365}\right] \quad \frac{kg}{VKT}$$

where: e = PM_{10} emission factor, kilograms/vehicle kilometers traveled (kg/VKT)
s = silt content of surface material, (%)
S = mean vehicle speed, kilometers per hour (km/h)
W = mean vehicle weight, ton

w = mean number of wheels
p = number of days with at least 0.01 inches of precipitation per year

Equation 1 was used to estimate emission rates for some of the more common types of heavy equipment in use at construction sites visited by staff. The calculation uses a silt content of 28.5 percent, which this is an average silt content for rural roads based on data collected by U.S. EPA (U.S. EPA, 1988; Cowherd et al., 1990). In the same publication, AP-42 gives a range of the number of days in California with at least 0.01 inches of precipitation per year of 40 to 130. The value used in the calculation is the median of the range. The mean vehicle weight and number of wheels are based on vehicle data sheets or measured values. The estimated asbestos emissions assume that the asbestos content of the particulate matter is 0.25 percent. In July 2000, the Board adopted an amended Asbestos ATCM for Surfacing Applications which limited the asbestos content of surfacing material to less than 0.25 percent. While 0.25 percent is the asbestos content that is used to determine if materials can be used for road surfacing, we do not know what the asbestos content might be in any construction project affected by the proposed ATCM. However, the emission rates in Table IV-1 are not intended to represent emissions from any actual construction project but to illustrate the potential for significant particulate matter and asbestos emissions and the effect of speed reductions on emissions. The resulting estimates for particulate matter and uncontrolled asbestos emissions are listed in Table IV-1.

Table IV-1. Estimated Particulate Matter and Asbestos Emissions Emitted by Heavy Construction Equipment[1]

Equipment Type	Maximum Operating Speed			Recommended Operating Speed		
	Speed [mph]	Particulate Matter Emission [lbs/mile]	Estimated[2] Uncontrolled Asbestos Emissions [lbs/mile]	Speed [mph]	Particulate Matter Emissions [lbs/mile]	Estimated Uncontrolled Asbestos Emissions [lbs/mile]
Back-Hoe/Loader – Caterpillar – Model 416C	10	12	0.03	N/A	N/A	N/A
Motor Grader – Caterpillar – Model 120H	26	52	0.13	15	30	0.075
Wheel Scraper – Caterpillar – Model 623	30	122	0.3	15	61	0.15

1. The results from Equation 1 have been converted into English units.
2. Estimated uncontrolled asbestos emissions based on 0.25% asbestos content and a vehicle travel distance of 0.6 miles (one kilometer).

Table IV-1 shows estimated emissions for three types of equipment: a backhoe/loader, a motor grader, and wheel scraper operating at a high and low speeds to illustrate the effect operating speed has on the amount of dust disturbed and released into the air. Assuming an asbestos content of 0.25 percent, the estimated uncontrolled asbestos emissions ranges between 0.03 to 0.3 pounds per mile traveled. While it is important to recognize that the data is hypothetical, the potential magnitude of emissions is of concern. The results indicate that significant reductions in particulate matter emissions can be achieved when vehicle speed is reduced. Watering also reduces emissions and can be up to 90 percent effective. The table also illustrates the difference in emissions between different types of equipment.

B. Estimated Particulate Matter and Asbestos Emissions from Quarrying and Surface Mining Operations

Many of the activities at surface mines and quarries can result in particulate matter emissions. These include blasting and excavation, screening, crushing and conveying processes used to produce aggregate, the deposition of material onto storage piles, on-site vehicle traffic, truck loading, track-out onto public roads, and wind erosion from storage piles and bare surface areas. To estimate emissions, we relied upon information from U.S. EPA and previous work by ARB staff. These emission factors are summarized in Table IV-2.

Table IV-2. Summary of Emission Factors for Quarrying and Surface Mining Operations

Process	Emission Factor [lbs/ton][1]
Blasting and Excavation	
Wet drilling	1×10^{-4}
Ledge drop operations	6.22×10^{-4}
Conveyor loading	1×10^{-4}
Truck loading w/front end loader	2×10^{-2}
Aggregate Processing	
Crushing	Uncontrolled - 1.7×10^{-2} Controlled - 1.1×10^{-3}
Screening	Uncontrolled - 1.5×10^{-2} Controlled - 8.4×10^{-4}
Conveyor drop points	1.4×10^{-3}
Conveyor transfer points	4.8×10^{-5}
Material transfer to storage pile	7.6×10^{-3}
Loading	2×10^{-2}
Track-out[2]	
Greater than 25 vehicles exiting the site	13 grams per vehicle pass on the paved road
25 or fewer vehicles exiting the site	5.5 grams per vehicle pass on the paved road
On-site vehicle traffic	0.11 tons per acre per month[3]

1. Emission factors from U.S. EPA AP-42 except where noted (U.S. EPA, 1995).
2. Source: Fugitive Dust Background and Technical Information Document for Best Available Control Measures (U.S. EPA, 1992)
3. Source: ARB Planning and Technical Support Division (ARB, 1997).

Using emission factors, an estimate of potential asbestos emissions can be made. To make this estimate, we use the information from Table IV-2 and apply it to a hypothetical quarry with the following operating characteristics:

Production rate:	300,000 tons/yr
Operating schedule:	250 days/yr, 8 hrs/day
Active quarrying area:	4 acres
Product in temporary storage piles:	two weeks production
Truck loads shipped:	50 /day
Moisture content of product:	5 percent
Number of days with >0.01 inches precipitation:	40
Percent of time wind speeds are > 12 MPH:	10
Percent asbestos in product:	5

Emissions from this hypothetical quarry would be approximately 1,300 pounds asbestos per year if truck loading were done by power shovel or front-end loader. Of that, 46 percent is from truck loading and 41 percent is from on-site vehicle traffic. If the product is loaded on trucks for delivery using a conveyor, emissions from truck loading fall to 30 percent and on site vehicle traffic becomes 53 percent of the emissions. These factors assume the quarry is using commonly used dust control measures. Table IV-3 shows the estimated asbestos emissions from the example quarry.

The values given in Table IV-3 are hypothetical and emissions will vary from quarry to quarry due to differences in processes. Hours of operation, amount of rock processed, and the asbestos content are all parameters that lead to variability of emissions. The values presented in Table IV-3 should not be used as a quantitative estimate to calculate risk but rather to give a qualitative picture of the potential for significant asbestos emissions from quarrying operations.

Table IV-3. Asbestos Emissions from a Hypothetical Quarry

Process Activity	**Emissions [lbs/yr]**
Drilling, blasting, and ledge drop operations	8
Truck loading and unloading (half from excavation)	600
Crushing, screening, and conveyors	54
Storage pile drop operations	12
On-site traffic	528
Track out	36
Wind erosion from storage piles and bare areas	57
Total	**1295**

Some quarries will not carry out some of these activities. Some small quarries do not use conveyors and some may not use crushers. Some do not do blasting or ledge drop operations. In general, in quarries with a lower production rate, emissions would be lower. If the moisture content were lower, emissions would be higher. If the asbestos content of the product were one percent, the emissions would be one fifth of those shown. If average winds were higher, emissions would be higher.

C. Potential Exposures and Risk from Naturally-Occurring Asbestos from Construction, Grading, Quarrying, and Surface Mining Operations

Information is presented below which demonstrates that asbestos has been found in air samples taken near construction, grading, quarrying, and surface mining sites located in areas where naturally-occurring asbestos is present. These data, in consideration of the potential for significant particulate matter and associated asbestos emissions previously presented in this chapter, provide sufficient basis to establish the fact that public exposures to asbestos do occur from construction, grading, quarrying, and surface mining activities. The potential risks from these activities varies widely, based on the fact that exposures are highly dependent upon a multitude of factors, such as asbestos content, wind speed, and moisture content. Thee combination of these and several other factors are unique in most every situation.

1. Sampling Near Construction and Grading Operations

The ARB has conducted limited air sampling at six sites near construction and grading operations in El Dorado County. The sampling occurred at various times between 1998 and 2000 in response to public concerns. Three of the six sites reported asbestos in the air samples. These results confirm that construction and grading operations, in areas where naturally-occurring asbestos is likely to be found, can result in detectable levels of asbestos off-site. While the levels of asbestos detected were low and the associated risk was less than 10 in a million for lung cancer and mesothelioma, it should be emphasized that these samples should be used only to verify the transport of asbestos off construction sites during earthmoving activities. The sampling was short term (three to six days) and not specifically designed to fully characterize asbestos emissions from construction or grading operations. The purpose of the sampling was only to determine if airborne asbestos was emanating from the construction site. As mentioned earlier in this chapter, many factors can affect the potential for particulate matter and asbestos emissions, such as the asbestos content of the soil, vehicle speed, vehicle weight, number of wheels per vehicle, the surface silt content, the area surface and texture, and surface moisture content. The specific monitoring results are presented in Appendix C.

Two additional studies regarding the potential for asbestos exposures from construction and grading activities are worth noting. In the fall of 2000, the City of Gilroy required air sampling while a construction project was being carried out on land known to have a serpentine outcropping containing asbestos (Gilroy, 2000). In this sampling program, both personnel monitors and ambient air sampling was conducted. The results of the ambient air sampling showed that asbestos was detected off-site. Additionally, detectable levels of asbestos were found in 90 percent of the personnel monitor samples. The associated potential cancer risk from the levels found in these personnel monitors ranged from non-detect to over a thousand per million.

In the late 1980's, the City of Fairfax, Virginia conducted air sampling for asbestos at construction sites located in rock formations and soils containing asbestos. Both personnel monitoring and ambient air monitoring were conducted. The dust generating activities included rock sawing, drilling, truck loading, excavating, blasting, grading, and on-site vehicular traffic. About 90 percent of the personnel air samples, showed detectable levels of asbestos. Many of the personnel samples showed extremely high concentrations of asbestos and perimeter ambient air sampling showed detectable levels of asbestos off-site. The ambient air samples showed potential cancer risks of mesothelioma and lung cancer ranging in the thousands per million. Fairfax County, Virginia has adopted regulations involving construction in areas of naturally-occurring asbestos, which contain similar mitigation measures included in the proposed ATCM.

2. Sampling Near Quarrying and Surface Mining Operations

The ARB has conducted several sampling studies at or near quarry and surface mining operations. The monitoring results presented in Table IV-4 show that asbestos is emitted from quarrying and surface mining activities when these activities occur in areas that have asbestos-containing rock or soil. The estimated mesothelioma and lung cancer risks associated with the monitored levels are also presented. The range of estimated potential risk is from 1 to 1300 chances per million if a person is exposed to the measured airborne asbestos concentration for 24 hours a day for 70 years.

Table IV-4. Summary of 1998-1999 Asbestos Monitoring Results and Associated Potential Cancer Risk in El Dorado, Trinity, Santa Clara, and Nevada Counties

Location	Number of Sites	Number of Samples	Number of Samples Above MDL[1]	Range of Average Potential Risk[2] by Site [chances per million]	
				Mesothelioma	Lung Cancer
Trinity County Inactive Quarry [3]	6	36	14	3 - 50	2 – 30
El Dorado County Serpentine Quarry [4]	8	91	70	2 - 920	1 – 530
Santa Clara County Raisch Quarry [5]	9	26	24	5 - 660	3 – 380
El Dorado County Bear Creek Quarry [6]	6	18	18	80 - 1300	50 - 750

1. MDL means minimum detection level.
2. When calculating the range of average risk by site, the concentrations of samples below the MDL were assumed to be half of the MDL.
3. In October 1998, ARB staff conducted three days of air monitoring near an inactive quarry in Trinity County. In this study, air samples were taken at six sites. One of the sites was designed to serve as a background site. Two of the other five sites included directional monitors, which operate only when the wind is blowing from a certain direction. The directional site data is not included in this table. In addition to the inactive quarry, two other potential sources of asbestos emissions were nearby. One was a lightly traveled unpaved road surfaced with aggregate from the quarry and the other was a road cut with exposed serpentine rock. (ARB, 2000)
4. In October 1998, the ARB conducted ambient monitoring near a serpentine quarry in El Dorado County. One of the sites was designed to serve as a background site. Data from the background site is not included in this table. See Appendix C for more information.)
5. Over a three-day period in August 1988, ARB staff conducted sampling at the Raisch Quarry property (ARB, 2000).
6. In June 1988 on-site sampling was conducted at the Bear Creek Quarry property (ARB, 2000).

As shown by the above information for construction, grading, quarrying, and surface mining activities, the potential exposure and the associated health risks for mesothelioma and lung cancer levels vary widely. Such exposures and risks are highly dependent upon a variety of factors that may influence total asbestos emissions. However, the data supports the conclusion that the public is exposed to airborne asbestos from these activities, thereby elevating their risk of ling cancer and mesothelioma. The risk is proportional to the amount of asbestos a person is exposed to over time. Because all forms of asbestos are carcinogens, health officials recommend that emissions of, and thus exposure to, this toxic air contaminant should be minimized.

V. THE PROPOSED CONTROL MEASURE

This chapter contains a summary of the proposed control measure. It also reviews the basis and rationale for selecting the provisions being proposed and alternatives considered by Air Resources Board (ARB) staff in developing this proposal. A copy of the proposed airborne toxic control measure (ATCM) is located in Appendix A.

The proposed control measure requires contractors and quarry or mine operators in areas where asbestos has been found, or is likely to be found, to minimize dust emissions. The purpose in proposing this ATCM is to reduce public exposure to naturally-occurring asbestos to the greatest extent possible, in consideration of cost and risk, and to promote statewide consistency. Currently, many of the dust control requirements for the activities that would be subject to this control measure are included in the land use permitting processes carried out by cities and counties or in local air district regulations. However, the dust control requirements can vary widely from place to place. Furthermore, the current dust control measures for these activities are not designed to protect the public from exposure to asbestos. In general, most current dust control measures are designed to promote compliance with ambient air quality standards for particulate matter of ten microns or less (PM_{10}) or to address nuisance dust complaints.

ARB staff believes that the proposed regulation will significantly reduce public exposure to naturally-occurring asbestos emissions from construction, grading, quarrying, and surface mining operations while providing flexibility to the industry to tailor the dust mitigation measures to their specific operations. None of the alternatives considered by ARB staff would have reduced exposures to an equivalent level at less cost.

A. Summary of the Proposed Control Measure

1. <u>Affected Sources</u>

The proposed regulation would affect persons doing construction, grading, quarrying, and surface mining where the areas to be disturbed contain naturally-occurring asbestos or serpentine or ultramafic rock. The specific types of activities covered are those involving soil disturbance, excavation, or rock quarry operations using mechanized equipment.

The identification of areas known to have or likely to have naturally-occurring asbestos, serpentine, or ultramafic rock is based on Department of Conservation (DOC), Division of Mines and Geology regional geologic maps, scale 1:250,000 or smaller. These identify the areas, known as geographic ultramafic rock units (GURU), which are known to DOC to have ultramafic rock. This is the rock type that DOC has identified as the more likely to have asbestos. There may be circumstances in which the geologic maps fail to identify areas where ultramafic rock has been detected or may be detected or areas where naturally-occurring asbestos occurs outside of a GURU. For this reason, the regulation also applies to operations in areas where the Air Pollution Control Officer (APCO), the DOC, the property owner, or project operator has knowledge of the occurrence of naturally-occurring asbestos, serpentine, or ultramafic rock in the area to be disturbed.

2. General Exemptions

There may also be areas identified on DOC maps within the GURUs where there is no serpentine or ultramafic rock. Therefore, included is a provision that would allow the APCO to exempt a project if a registered geologist determines that there is no serpentine or ultramafic rock in the area to be disturbed. When reviewing the exemption request, ARB staff expects that the APCO would retain the services of a registered geologist to address any issues related to the geologic evaluation.

When seeking a general exemption from the ATCM by way of a geologic exemption, it is important for the applicant seeking the exemption to contact the local air district prior to submitting an exemption application. By doing so, the applicant and the district will be able to discuss all of the information the district needs in order to consider the exemption request and ensure that a complete application is submitted. Failure to contact the district prior to submitting an exemption application may result in delays in processing the exemption request.

Among the general exemptions is a provision that exempts individuals in residential areas (homeowners and tenants) carrying out construction and grading activities on their own property when the area to be disturbed is less than one acre. ARB staff believes that the minimal dust mitigation measures should be used any time an activity has a potential to raise dust in an area where asbestos may be present. However, staff believes the administrative burden on the local air districts and the difficulty in enforcing the requirements for work practices on homeowners and tenants makes such an approach unworkable. The ARB staff plans to pursue an education and outreach program to inform homeowners and tenants of the potential for exposure and what they can do to reduce their exposure. We believe this will be the most effective means of increasing awareness of the need to take precautions when working in areas where asbestos may be present. Additionally, the Department of Real Estate has issued letters to subdivision property owners whose property may be in areas likely to contain naturally-occurring asbestos. These letters notified them of revisions to their public reports. These revisions disclose the likelihood that natural occurrences of asbestos may be present in rock materials located on or in the vicinity of their property (see Appendix D).

Agricultural operations and timber harvesting operations are also exempted. The exemption for agricultural operations is provided because we do not anticipate significant agricultural activities in areas where ultramafic rock is present. Because of high levels of iron and magnesium and low levels of calcium, soils in ultramafic rock areas are not highly desirable for farming. In fact, vegetation in ultramafic areas is noteworthy for its sparseness, stunted growth, and unique plant species (DOC, 2000b). The exemption for timber harvesting is appropriate given that this activity generally occurs in remote locations and typically not more than once every ten years. Furthermore, dust control is often impractical given the location and the terrain. This exemption does not apply to road and building construction.

Sand and gravel operations can obtain an exemption for activities associated with the removal, processing, and storage of material extracted from alluvial deposits. This exemption is provided because of the low probability of finding asbestos in alluvial deposits.

3. Requirements for Road Construction and Maintenance

The requirements for road construction and maintenance apply to operations that disturb the soil surface. Projects which would disturb the soil surface and which are in a geographic ultramafic rock unit must notify the district in writing prior to the beginning of the operation. If the presence of naturally-occurring asbestos, serpentine, or ultramafic rock is discovered after the beginning of a road construction or maintenance project, the district must be notified by the next business day and comply with specified dust control requirements within 24 hours.

The regulation specifies the implementation of dust control measures sufficient to prevent the emission of visible dust to the ambient air during any activity that disturbs the native soil and that areas of native soil subject to vehicle traffic be kept adequately wet. Additionally, vehicle speeds must be limited and vehicles that have traveled across bare soil surfaces must pass across a track-out prevention device prior to resuming travel on a paved public roadway.

a. Exemptions for Road Construction and Maintenance

The proposed ATCM provides an exemption from the advance notification requirements to ensure that road maintenance activities that need to occur because of an emergency are not unnecessarily impeded. Examples of emergency situations include road repairs necessary because of landslides, fires, or floods. The APCO must be notified of the emergency activity by the next business day. The APCO may also exempt roads that are at least a mile from any residence, hospital, day care center, worksite, business, or developed campground. These exemptions do not apply to building construction and quarrying activities.

4. Requirements for Construction and Grading

The requirements for construction and grading operations depend upon the size of the area to be disturbed. The regulation contains requirements for disturbed areas of one acre or less and requirements for disturbed areas greater than one acre.

a. Areas of One Acre or Less

The regulation specifies minimum control requirements for locations in which the surface area to be disturbed is one acre or less. These minimum requirements generally require vehicle speeds to be limited to 15 miles per hour or less, wetting of stockpiles and surfaces that will be disturbed, and track-out prevention and cleanup. In many cases, these measures can be carried out without the purchase of control equipment.

The minimum control requirements are to be implemented at the start and maintained throughout the duration of the construction or grading activity occurring in a GURU shown on the geologic maps. If naturally-occurring asbestos, serpentine, or ultramafic rock is discovered on a site outside the GURU, the minimum control requirements are to be implemented within 24 hours and the local air district is to be notified by the next business day.

b. Areas Greater than One Acre

An operation located in a GURU that will be disturbing more than an acre of soil surface is required to submit an asbestos dust mitigation plan for approval by the local air district. An asbestos dust mitigation plan must incorporate measures to control all of the following potential exposure sources:

- Track-out onto the paved public road;
- Inactive disturbed surface areas and storage piles;
- Traffic on unpaved on-site roads;
- Active storage piles;
- Earthmoving activities;
- Off-site transport of materials; and
- Post-project stabilization of disturbed soil surfaces.

The operator and the district should work together to decide the specific dust mitigation measures to be included in the dust mitigation plan that addresses each of the above items. This approach emphasizes flexibility by allowing for the consideration of site-specific factors. It also provides an opportunity to try new technologies that may become available. Additionally, existing requirements from a use permit, zoning permit, or district operating permit can be used as a basis for the asbestos dust mitigation plan. The district may also require that the asbestos dust mitigation plan include a plan for air monitoring. Some of the options for dust mitigation measures from the various emissions sources are shown in Table V-1.

Table V-1. Dust Mitigation Options For Large Construction Projects

Emission Sources	Dust Mitigation Options
Track-out	• Gravel pad • Grizzly • Wheel wash system • Wet sweeping • HEPA filter vacuum
Disturbed surface areas and inactive storage piles	• Apply water • Maintain a crust • Apply dust suppressants or chemical stabilizers • Cover with tarps or vegetative cover • Install wind barriers
Traffic on unpaved on-site roads	• Restrict vehicles to 15 MPH or less • Keep roads adequately wetted • Apply dust suppressants • Cover with non-asbestos gravel
Active storage piles	• Keep wet • Cover with tarps
Earthmoving activities	• Pre-wet to depth of cuts • Suspend grading when winds are high • Apply water
Off-site transport of material	• Ensure trucks are maintained such that no spillage can occur from holes or other openings in cargo compartments • Ensure that loads are wet and tarped or wet and loaded with 6 inches of freeboard
Post-construction disturbed areas	• Establish and maintain a vegetative cover • Cover with at least 3 inches of non-asbestos material • Pave

The provisions of the approved plan must be implemented at the beginning and maintained throughout the duration of the operation. If the occurrence of naturally-occurring asbestos, serpentine, or ultramafic rock is discovered after the project begins, the owner/operator must notify the district by the next business day and implement the minimum control requirements specified in the regulation within 24 hours. In addition, the owner/operator must submit an asbestos dust mitigation plan to the district within 14 days and implement the provisions of the asbestos dust mitigation plan within 14 days of the date the district approves it.

The regulation contains provisions that permit existing projects to continue operating until a district-approved asbestos mitigation plan is in place. New projects, however, are expected to have their asbestos dust mitigation plans in place and be fully prepared to implement that plan prior to the start of any construction or grading activity. Some industry representatives have stated that this approach would unnecessarily delay many construction projects, particularly since there is no deadline by which local air districts must approve the asbestos dust mitigation plan. Staff does not agree with this statement because proponents are already accustomed to working through the planning process. Most planning departments are not constrained to act within a certain amount of time; therefore, there is no basis to limit the time in which districts need to act. Staff strongly encourages sources to contact the district early in the project planning process.

c. Recordkeeping and Reporting Requirements for Construction and Grading

Certain records must be kept for a period of seven years. The requirement to keep records for seven years is consistent with the recordkeeping provisions of the 1990 asbestos ATCM, which has been in effect for 10 years. These records include the results of any air monitoring done at the request of the district, the results of any geological evaluation conducted on the property, and the results of any bulk sampling requested by the district or conducted for the purpose of demonstrating the applicability of (or compliance with) the ATCM. Information which must be reported to the district includes the results of any air monitoring initiated at the request of the APCO, any bulk sampling done to demonstrate the applicability of (or compliance with) the ATCM, or any other information requested by the APCO. If a specific reporting frequency is desired, the proposed ATCM allows that frequency, as approved by the district, to be incorporated as a part of the asbestos dust mitigation plan.

5. Requirements for Quarrying and Surface Mining Operations

Operators of existing quarries and surface mines in areas designated on the geologic maps as a GURU will be required to implement a district-approved asbestos dust mitigation plan within 120 days of the effective date of this regulation. Similar to the construction and grading requirements, districts may require air monitoring as part of the dust control plan. New quarries and surface mines will be required to obtain a district-approved asbestos dust mitigation plan prior to beginning operation. Some of the proposed dust mitigation options to be included in the plan are shown in Table V-2.

The regulation also specifies generic dust mitigation requirements that would apply to quarries and surface mining operations where naturally-occurring asbestos, serpentine, or ultramafic rock is discovered subsequent to the initiation of activity. Some mitigation measures are to be implemented within 24 hours of the discovery and others within 14 days.

The following measures are to be implemented within 24 hours of the discovery:

- Exposed areas that are prone to mechanical or wind disturbances are to be kept adequately wet or controlled using dust palliatives or suppressants, paving, wind berms, or breaks or covered with non-asbestos containing material;
- Materials to be quarried, excavated, or graded must be kept adequately wet;
- Loads must be adequately wet before and during truck loading;

- Vehicle speed in the quarry or mine must be limited to 15 miles per hour or less;
- Stock and working piles are to be kept adequately wet during the addition and removal of materials; and
- Loads in trucks transporting materials off the site must be adequately wet and covered or adequately wet and have a six-inch freeboard. A six-inch freeboard means that the load can not extend above the top of the cargo compartment at any point and can not contact the sides, back, or front at any point less than six inches from the top of the cargo compartment.

Table V-2. Dust Mitigation Options for Quarries and Surface Mines

Emission Sources	Dust Mitigation Options
Material handling	• Spraybars on conveyors • Shrouds on drop points • Keep materials wet during excavation, grading, and truck loading
Track-out prevention and removal	• Gravel pad • Grizzly • Wheel wash system • 50 feet of paving • Wet sweeping • HEPA filter vacuum
On-site roads open to the public	• Pave with asphalt or concrete • Treat with a dust suppressant • Cover with non asbestos gravel
On-site traffic	• 15 MPH speed limit • Keep roads wetted
Active stock piles	• Keep wetted
Offsite transport of material	• Ensure trucks are maintained such that no spillage can occur from holes or other openings in cargo compartments • Ensure that loads are wet and tarped or wet and loaded with 6 inches of freeboard
Inactive stockpiles and exposed areas	• Keep wetted • Apply dust palliatives or suppressants • Cover with non-asbestos material

Within 14 days the owner/operator must implement track-out control measures sufficient to prevent track-out onto the paved public road at any entrance or exit to the operation and clean up any visible track-out at least once a day. They also must install equipment such as spraybars and shrouds to ensure that the material being crushed, screened, or conveyed does not emit dust that is visible to the naked eye at the property line. Finally, they must stabilize on-site unpaved roads open to the public by paving them, treating them with a dust suppressant or covering them with non-asbestos gravel (gravel with less than 0.25 percent asbestos, as determined by an approved asbestos bulk test method).

The owner/operator of a site in which the presence of naturally-occurring asbestos, serpentine, or ultramafic rock is discovered subsequent to the beginning of operations must submit an asbestos dust mitigation plan to the district within 14 days of the discovery and implement the generic dust management requirements until the provisions of the district-approved plan are implemented. The generic dust management practices are intended as the basis of asbestos dust mitigation plans and are designed to provide a wide degree of flexibility while maintaining adequate public health protection. This flexibility allows each quarry or surface mine to consider site-specific conditions when developing their asbestos dust mitigation plan.

The proposed ATCM also requires minimal dust mitigation measures for mineral exploration activities.

a. Recordkeeping and Reporting Requirements for Quarrying and Surface Mining

The results of any air monitoring conducted at the request of the APCO and the results of any bulk sampling conducted for the purpose of demonstrating the applicability of (or compliance with) the ATCM or at the request of the APCO must be reported to the district. Records of the results of any air monitoring conducted at the request of the APCO, any geologic evaluation, and any bulk sampling conducted for the purpose of demonstrating the applicability of (or compliance with) the ATCM, or any other information requested by the APCO, must be maintained for at least seven years. If a specific reporting frequency is desired, the proposed ATCM allows that frequency, as approved by the district, to be incorporated as a part of the asbestos dust mitigation plan.

6. Ambient Monitoring

The proposed regulation specifies that the district APCO can require ambient monitoring for asbestos. It also specifies the analytical methods to be used. Ambient air monitoring can provide useful information in certain circumstances. For example, it can be used to evaluate the effectiveness of dust mitigation measures and to ensure that the measures taken are adequate for special circumstances, such as when there are sensitive receptors near a major construction site. Ambient monitoring can also allow the district to consider appropriate modifications to the asbestos dust mitigation plan or to monitor compliance when there is a history of non-compliance or evidence of off-site transfer of particulate matter. ARB staff expects that these are the primary purposes for which the requested ambient monitoring will be used and that it will not be required for most sources. Furthermore, based on our discussions with the local air districts, we do not expect that district-required asbestos ambient monitoring programs will have an excessively large number of samples or be continuous in nature with ongoing monitoring requirements.

7. Test Methods

Test methods are specified for testing bulk materials for asbestos content, analysis of air samples, field determination of whether a material is adequately wet, and measurement of the stability of surface crusting.

8. Definitions.

Numerous definitions have been included in the proposed ATCM to ensure clarity.

B. Basis and Rationale for the Control Measure

A number of information sources form the basis for the requirements of this proposed regulation. Among them are visits to numerous quarries and construction sites, district dust control rules, district permits for sources, air monitoring data collected over many years, and U.S. EPA studies of fugitive dust sources and the emission factors in the U.S. EPA Compilation of Air Pollutant Emissions Factors (AP-42). ARB staff considered these information sources and other requirements, their cost and feasibility, and the potential health effects of asbestos in developing the proposed ATCM.

Based on this information, staff identified activities and conditions that contribute to the emission of dust from construction, grading, quarrying, and surface mining operations. When there is asbestos in the material being processed or in the soil being disturbed, the dust emitted during that activity will contain asbestos. Because asbestos is a toxic air contaminant for which there has not been a threshold level identified below which adverse health effects are not expected, Health and Safety Code section 39666 requires that this regulation reduce emissions to the lowest level achievable through application of the Best Available Control Technology (BACT) or a more effective control method. In doing so, the ARB must consider the factors in section 39665(b), including cost and risk, to the extent that data can reasonably be made available.

The basis for most of the control requirements for construction and grading operations is the dust mitigation requirements in district rules for various parts of the State. ARB staff reviewed all the district rules for control of fugitive dust and PM_{10}. From the dust mitigation measures incorporated in these rules, staff identified the best management practices and reasonably enforceable standards. For the requirements for roads and quarries, we considered the information available about dust emissions and consulted with districts, other State agencies, and other sources to identify the best available measures currently being used in the industry. Also, ARB staff visited several quarries and construction sites to observe current dust mitigation practices.

Due to the variable nature of naturally-occurring asbestos and the variety of sources and inconsistent control requirements that currently apply, we can not make a quantitative estimate of the potential reduction in asbestos exposure. However, based on studies done of the effect of watering on soil dustiness for the U.S. EPA in Maricopa County, Arizona doubling the moisture content above the dry soil value results in a control efficiency in the range of 90 percent as compared to uncontrolled emissions (MRI, 2000). We would anticipate many of the dust mitigation measures identified in the proposed ATCM, when properly used, will approach a similar 90 percent effectiveness.

Insofar as the proposed control measure incorporates BACT, reduces dust emissions and promotes statewide consistency, it is consistent with the legislative direction and our purpose in pursuing this control measure. Below is a discussion of some district requirements that are similar to those included in the proposed ATCM. The success of the districts in obtaining compliance with these rules demonstrates that the requirements of the proposed ATCM are readily achievable and cost effective.

1. <u>Lake County Air Quality Management District</u>

The Lake County Air Quality Management District adopted Rule 467 for asbestos emissions following the Board's adoption of the 1990 Asbestos ATCM. Rule 467 goes well beyond the 1990 asbestos ATCM in that it regulates all construction in serpentine outcrops or alluvial material from a serpentine outcrop that has an asbestos content greater than one percent and any unpaved road or trail intended for motorized use by the public if it is:

- Located on serpentine outcrops or contains serpentine material with an asbestos content greater than one percent;
- Greater than 260 linear feet or 160 square feet; and
- Located in an area zoned for residential, commercial or industrial use, or has a dwelling density greater than two units per acre, or within 200 feet of a dwelling regularly inhabited by five or more people.

These sources must file and get approval of a dust mitigation plan. The dust plan must specify mitigation measures for excavation, roads, yards, driveways, parking areas, hauling, and tracking of material onto adjacent roadways. All material must be transported in a manner that minimizes dust emissions and emissions from transport may not exceed five percent opacity 20 feet from the traveled surface. The rule also requires worker notification and posting of warning signs.

2. <u>South Coast Air Quality Management District</u>

South Coast Air Quality Management District (SCAQMD) Rule 403 is one of the most comprehensive district dust control rules. This rule applies to any activity or man-made condition capable of generating fugitive dust. Table V-3 shows a summary of the rule. Operations which comply with Rule 403 will need to do little or nothing further to comply with the ATCM. This is because Rule 403 requires best available control measures to minimize fugitive dust. One of the best available control measures for unpaved roads identified in Rule 403 is a limit on vehicle speeds to 15 MPH or less.

It also prohibits emissions visible beyond the property line or emissions that cause or contribute to concentrations of PM_{10} that exceed 50 grams per cubic meter (g/m^3).

Among the provisions of the rule is an exemption from the emissions standards for a disturbed surface area less than one half acre on property zoned for residential uses. There are also alternative requirements for high wind periods.

Table V-3. Summary of South Coast AQMD Rule 403

Prohibits the emission of fugitive dust that remains visible in the atmosphere beyond the property line
Requires the use of best available control measures to minimize the emission of fugitive dust
Prohibits a person from causing or allowing PM_{10} emissions to exceed 50 micrograms per cubic meter based on simultaneous upwind-downwind samples
Requires the owner/operator to prevent track-out or remove it within one hour, or (1) pave or chemically stabilize at least 100 feet of access road from the intersection with the paved road, or (2) pave 25 feet and install a track-out control device, or (3) other as approved, and prevent track-out and remove material anytime the track-out extends a cumulative distance of 50 feet on a paved public roadway and remove all visible track-out at the end of each workday.
Large operations (100 acres of disturbed surface or daily earthmoving volume greater than 10,000 cubic yards three times in 365 days) and medium operations (between 50 and 100 acres disturbed surface or daily earthmoving volume of between 5,000 cubic yards and 10,000 cubic yards three times in 365 days) if under a contingency notification must also obtain an approved fugitive dust emissions control plan

SCAQMD Rule 403 also provides control measures that can substitute for the 50 microgram per cubic meter limit. Earth moving operations except quarrying or construction cut-and-fill can maintain a soil moisture level of 12 percent. Operations that are more than 100 feet from all property lines can conduct watering as necessary to prevent visible dust emissions from exceeding 100 feet in length in any direction. Construction cut-and-fill operations can maintain the soil moisture of 12 percent or if the optimum moisture content for compaction is less than 12 percent, complete the compaction process as expeditiously as possible after the soil moisture reaches at least 70 percent of the optimum.

SCAQMD Rule 1158 (Storage, Handling, and Transport of Coke, Coal, and Sulfur) prohibits emissions greater than 10 percent opacity. It requires enclosed storage for all piles, truck, or railcar unloading. Additionally, the enclosed structure must be equipped with a water spray system or an air pollution control system, and all new conveyors must be covered. Also, silt loading on roads must not exceed 0.05 grams per square meter (g/m^2) on track-out roads and 0.25 g/m^2 on roads and vehicle movement areas on the facility. The rule requires the facility operator to use a street sweeper to clean any track-out. The street sweeping shall be sufficient so that not more than four hours elapses between sweeps or after every 100 truck material receipts or dispatches, but not less than one time daily when the facility is open for business. Any material spills of more than three pounds, or that cover more than one square foot must be cleaned up within one hour.

C. Alternatives Considered

1. No Action

One alternative would have been not to develop the proposed ATCM. This alternative would have left the control of dust emissions under the regulation of a plethora of air district, local building and development agencies, and other government agencies. Some of these agencies have competing concerns, limited resources, and are not always focused on air quality issues. Consequently, we believe that this option would not result in an effective and consistent approach in minimizing emissions from sources of naturally-occurring asbestos.

2. Regulatory Standards Based On Visible Emissions Evaluation

This alternative would have set opacity standards for sources and activities based on the ability of trained "smoke readers" to distinguish the density of emissions. We rejected this option for construction and grading and road construction and maintenance because in order for sources to be sure that they were in compliance, they would have had to have staff trained in visible emissions evaluation. This training is available to the public, districts, and industry from the ARB's Compliance Division. However, certification requires an initial three-day training program and semi-annual re-certification. We believe that this is an unnecessary burden and would have provided less consistent protection to the exposed population since it could allow higher dust concentrations off-site than the chosen approach. We have retained visible emission standards for quarrying and surface mining. The cost is less because of the smaller number of these operations affected and many district rules specify opacity limits so many operators already have staff trained in visible emission evaluation. To ensure that the approach did not result in greater risk to the public we also require that there be no visible emissions crossing the property line.

3. Applicability Based Solely on the Geologic Maps

This approach would have provided a simple determination of which operations were affected by the regulation. However, because of the physical conditions and the scale of the regional maps, there could be properties within the areas designated as GURUs that do not in fact have ultramafic rock. Conversely, there could be areas of ultramafic rock or naturally-occurring asbestos that were not included on the maps either because they had not been discovered when the maps were drawn or because they were to small to show on the scale of 1:250,000. Nevertheless, the regional maps are a good starting place for identifying the potential locations of these rock types. Our solution to these concerns was to add provisions for excluding property through a geologic evaluation and adding requirements when these rock types were subsequently discovered.

4. The Determination of Adequately Wet

ARB staff evaluated the possibility of designating a standard percent moisture as adequately wet. There is an ASTM (American Society for Testing and Materials) method for determining percent moisture that involves taking a sample of material, weighing it, drying it in an oven and re-weighing it. It is not a burdensome method. However, adequately wet in percent moisture can differ depending on the texture and constituents of a soil mix or aggregate. Some local district dust rules specify a 12 percent moisture content unless that is too moist to achieve the necessary compaction for soil. In a conference with ARB, industry sources said a pile of sand at 12 percent moisture wouldn't form a stable pile. Rather than try to identify percent moisture for each type of material that would be addressed in this regulation, we went for a simple objective oriented field test method for adequately wet. The rationale behind this approach is the assumption that if a material does not evolve dust when dropped from a height of four feet on a hard surface, it is not likely to cause emissions that will exceed the dust emission standard during processing. This assumption has not been extensively tested. However, whether the material passes this test or not, the guiding principle is the avoidance of emissions. If the visible dust requirements are not being met, the material is not adequately wet.

In the event that the owner/operator of a source desires to identify a percent moisture for specific areas or materials and can demonstrate to the district that these moisture levels result in good dust control, these specifications can be made part of the district-approved asbestos dust mitigation plan.

5. Prescriptive Standards

This approach would specify a set of requirements for each type of operation. We felt this was too inflexible because it did not allow for the consideration of site-specific constraints. For instance, if we were to specify 50 feet of paved access road to prevent track-out this might not be feasible for a project with limited open space. Since there were several options for controlling the dust emission sources that could be reasonably effective we opted to identify standards and leave the choice of technique up to the district and sources whenever we could. This approach provides the maximum amount of flexibility consistent with the goal of public health protection. It also does not impede the development of new and improved techniques that might be developed in the future.

6. Compliance Based Solely on Air Monitoring

This alternative would have required ARB to set an "acceptable" level of asbestos in ambient air and specify that no source could exceed it based on ambient air monitoring. Because asbestos is a TAC for which no threshold level for safe exposure has been established, State law requires the control measure be designed to reduce the emissions to the lowest level achievable through the application of best available control technology.

7. Exempting Areas of Ultramafic Rock that are Determined to be Asbestos-Free

This alternative would allow a source to be exempted if a geologic evaluation showed that there was no asbestos in the area to be disturbed even if there was ultramafic rock. Asbestos occurs in ultramafic rock because it has all the necessary mineral constituents for the formation of asbestos. However, the actual formation of asbestos is the result of changes (metamorphism) that occur in the ultramafic rock under certain conditions. Whether those conditions have occurred in any rock body would require a close and detailed examination of that rock body. To be assured that the methods used were adequate and that they supported the conclusion reached, the report and possibly the site would have to be reviewed by DOC staff before the APCO could consider granting the exemption. In addition, as the operation excavated the rock body, the evaluation would have to be repeated for each new area of rock to be disturbed.

It is unlikely that a geologist would be able to state with a relatively high level of certainty that asbestos does not exist at various places within an ultramafic rock body. Based on informal discussions with DOC staff, ARB does not believe that the necessary tools and techniques exist that would enable a geologist to make this determination. However, we are continuing to seek the advice of DOC staff on this issue. Additionally, implementing this option could result in significant costs to state and local government agencies, including the ARB and DOC. Finally, this approach may not be feasible because a geologic evaluation to establish the absence of asbestos in an ultramafic rock body could be a great deal more costly than implementing the dust mitigation requirements of the proposed regulation.

8. Separate Regulatory Requirements for Different Types of Asbestos

This approach would impose different requirements based on the occurrence of a particular type of asbestos. Alternate requirements would apply if a geologic evaluation showed that amphibole asbestos occurred on a particular site. This was suggested because of arguments that indicate that amphibole asbestos may be more likely to cause mesothelioma than chrysotile asbestos.

We rejected this approach based on the following considerations. First, asbestos was evaluated under the procedures laid out in the Health and Safety Code for evaluating the health effects of candidate TACs. These procedures include a review by an independent panel of scientists to determine that the best available scientific information was used in the evaluation. This evaluation provides toxicity factors to be used in making the determinations about the need and appropriate degree of regulation for TACs. That evaluation provided toxicity factors for all asbestos fibers with an aspect ratio of 3:1. In the years since asbestos was identified as a TAC, the Office of Environmental Health Hazard Assessment has reviewed the evidence that amphiboles were more likely to cause mesothelioma. Their conclusion was that the evidence was not adequate to support the development of new toxicity factors at this time. Second, Health and Safety Code section 39666, which authorizes the development of ATCMs, gives specific direction for ATCMs for TACs with no identified threshold for adverse health effects. This statute requires that the ATCM result in the lowest achievable emission rates through application of BACT in consideration of cost and risk, unless an assessment indicates that an alternate control method is necessary to protect public health. Third, this suggested approach would require an impractical, and potentially improbable, detailed assessment of all sites to determine which type of asbestos is present (on some sites both chrysotile and amphibole asbestos is found), which would add significant costs for all affected projects. In any event, the approach we have taken with the ATCM would still be valid.

VI. CONTROL TECHNOLOGY

In this chapter, we summarize some of the dust control options the Air Resources Board (ARB) staff has observed during site visits as effective methods for reducing dust emissions from construction, grading, quarrying, and surface mining. When asbestos is present in the soil or rock being disturbed these control options will also reduce emissions of asbestos to the ambient air. The options presented are intended as a guide to available dust control options. These individual options may not be applicable to all sites. However, there are multiple options for controlling dust and associated asbestos emissions for each emission source on a site. Staff believes that effective dust control options are available for all emission sources. More information regarding the costs associated with these options is presented in Chapter VII.

A. Construction Sites

Most of the air districts have regulations for fugitive dust. These regulations vary widely in approach and requirements. Site visits by ARB staff and our conversations with air district staff indicate that most construction sites use some dust mitigation measures. Among the most commonly used are surface watering to reduce emissions from the grading equipment and temporary paving or gravel pads to prevent track-out. When used consistently, these measures reduce dust emissions and are reasonably available and effective controls.

On sites where dust emissions are a hazard as well as a nuisance, additional mitigation measures may be needed. The United States Environmental Protection Agency (U.S. EPA) provides guidance on available dust control techniques, which constitute Best Available Control Measures (BACM) for areas in serious non-attainment for particulate matter less than ten microns in diameter (PM_{10}) (U.S. EPA, 1992). Using information from the BACM guidance and regulations adopted by air districts, we have identified some of the activities that constitute best management practices for construction sites.

1. Site Preparation

Most developers will start construction on a site by building a launching or staging area. The launching area usually has a section for equipment storage, a fuel and supply storage area, and an office for site management activities. The entry and exit point from the launching area as well as any other entry and exit points onto the site may be designed as a knock-out area for material picked up by vehicles or equipment used on the site.

The staging area may be paved or have a gravel pad. Based on site visits, a gravel pad is a very effective measure for preventing material from leaving the site. Pavement is effective if it is long enough and if it is kept reasonably free of tracked or spilled material. Installing a gravel pad for track-out control is estimated to cost from $1,000 to $2,000.

2. Excavation

The extent of excavation that is needed on a given site will depend on the initial slopes and the desired slopes at completion. Excavation can be a significant source of emissions. Adding moisture or suspending the operation when winds are high can reduce emissions from activities associated with excavating. Adding moisture counters the creation of fines due to the mechanical action of the excavation equipment and the pulverization of materials by the equipment's wheels. It also replaces moisture lost to evaporative emissions when the newly scraped surface is exposed to the surface elements (heat from the sun, wind, etc.).

Moisture needs to be added at regular intervals to ensure that the material is kept adequately wet during the excavation period. There are several ways this can be accomplished. The two most common ways would be using a portable water trailer or a water truck. For sites larger than an acre, a water truck may be more cost effective. For sites less than an acre, a water trailer may be the better choice.

Using a portable water trailer on an area approximately 0.5 acre costs approximately $200 per day (for a residential lot) including water permits. Assuming the excavation could be completed in one to two days, the cost would range from $200 to $400 per lot. The cost for watering using a water truck is approximately $65 per hour. The additional cost for water will depend on cost and proximity of the water source. The cost effectiveness of using a water truck will depend on the size of the site. For excavation of an acre, the cost is approximately $1,500. On a larger site, the watering truck can be used more efficiently. Therefore, the cost of watering would be lower.

Occasionally blasting is required on sites within residential or other populated areas. Blasting can be a source of flying rocks as well as dust. However, blasting mats are not an effective means of dust control. Blasting mats can reduce the incidence of flying rocks but will have minimal effect on dust emissions. More effective dust control can be achieved by covering the blast area with wet dirt. The amount of dirt used should be based on best engineering judgement taking into consideration the amount of the charge, the size of the blast area, and the proximity to receptors and other structures. Proper design of the charge can minimize the emissions as well. The need to blast will not be universal nor does the proposed regulation require specific control for blasting emissions. However, the cost of covering the area with wet dirt will be minimal because the dirt and water costs are minimal and the necessary equipment is usually already on-site.

3. Storage Piles and Exposed Areas

Emissions from storage piles occur due to both wind erosion and the effect of equipment moving on and in the vicinity of storage piles. The use of moisture to minimize emissions from storage piles can be an effective control measure. On sites where a scraper is used to create the pile, the emissions are minimal and the scraper can compact the pile as well. A water truck can be used to provide moisture to aid in compaction. Cost for the water truck would be similar to or less than that mentioned in Part 2 of this section depending on the truck's overall utilization at the site.

On large construction sites, grading equipment can be used to further compact the material to prevent wind erosion. On small sites, watering and keeping the pile size down to four or five feet in height offer sufficient control of emissions. Screening piles from wind is another effective dust mitigation measure. Berms divert the wind so it can not pick up particles and bounce them along releasing other particles due to the impact. Additionally, the wind speed is reduced in the lee of the berm thus reducing emissions. Studies of wind fences and other porous barriers such as trees have shown that they can effectively reduce wind velocity and consequently emissions.

If the piles will be removed from the site and transferred to a landfill or other disposal area, application of a chemical agent such as a surfactant that permits more extensive wetting may be used. However, continuous chemical treating of material loaded onto piles may be necessary because whenever the surface is disturbed the potential for emissions is renewed. The use of chemical stabilizing agents such as polymers can effectively eliminate emissions from inactive storage piles or open areas for more than a year as long as the surface is not disturbed. The cost for chemical suppressants ranges from $0.04 to $1.00 per square yard. This cost estimate assumes that the water supply is easily available and at a minimum price compared to the cost per square yard of the suppressant.

The most effective methods for reducing emissions from an inactive area are covering the area with non-asbestos containing materials and re-vegetating. Also, small piles that are not being continuously used can be covered with tarps. Tarps for small piles can range from $1.00 to $4.00 per square yard.

4. Track-Out or Carryout

Material carried off the site and onto public roads by exiting vehicles can be a significant source of dust emissions. Very good control can be achieved if the deposits on the road are prevented. A gravel pad is expected to achieve the best results for preventing track-out (see Part 1 of this section). However, a developer may choose to pave the knock-out area. The cost of paving a quarter mile of road is estimated to be around $3,000. The cost associated with a light water flushing followed by sweeping using a street sweeper is approximately $107 per hour.

The effectiveness of a paved area in reducing track-out will depend on how often the paved area is cleaned and the amount of material that accumulates on the paved area between cleanings. This is influenced by the traffic level on the paved road and the amount of spillage and track-out from adjacent areas. Table VI-1 gives the efficiency of various methods used to clean paved roads (U.S. EPA, 1992). This information is useful for evaluating the necessary frequency of cleaning for paved public roads with visible track-out from a site. Sweeping with a HEPA filter equipped vacuum may achieve greater reductions than those shown in Table VI-1 but staff is not aware of any field tests done to establish control efficiency.

Table VI-1. Efficiency of Various Methods of Cleaning Paved Roads[1]

Method	Cited Efficiency	Comments
Vacuum sweeping	0-58%	Field emission measurement (PM_{15}) 12,000-cfm blower[2]
	46 %	Based on field measurement of 30 μm particulate emissions
Water flushing	69 –(0.231 V)[3,4]	Field measurement of PM_{15} emissions[2]
Water flushing followed by sweeping	96 –(0.263 V)[3,4]	Field measurement of PM_{15} emissions[2]

1. Adapted from Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures, U.S. EPA, 1992
2. PM_{10} control efficiency can be assumed to be the same as that tested.
3. Water applied at 0.48 gal/yd^2
4. Equation yields efficiency in percent, V = number of vehicle passes since application.

B. Quarries and Surface Mines

Most mines and quarries in California use best management practices to reduce dust emissions. Most of the air districts have regulations for fugitive dust. However, the requirements vary widely in complexity and approach. Among the more commonly used dust control measures, are road watering to reduce emissions from truck traffic and spraybars on conveyors to reduce dust emissions from crushing, screening, and conveying. If applied conscientiously, these measures reduce nuisance dust and are reasonably available mitigation options for areas that are not in serious non-attainment of PM_{10} standards.

In areas designated in serious non-attainment of PM_{10} standards or at sites where dust emissions are potentially, more effective measures may be needed. The U.S. EPA provides guidance on available dust control techniques which would be BACM for areas in serious non-attainment for PM_{10} (U.S. EPA, 1992). Using information from the BACM guidance and regulations adopted by the local air districts, we have identified some activities that constitute best management practices for surface mines and quarries that have the potential to emit asbestos.

1. Blasting and Excavation

Staff has identified a technique that can reduce dust emissions from blasting in construction projects that involves covering the area to be blasted with mud. However, staff is not aware of any quarries or mines that employ this technique. Blasting mats used in some locations to reduce the incidence of flying rock are not effective in reducing dust emissions. Blasts can be designed to minimize the upward force of the detonation. Restriction of blasting to times of calm winds may help prevent blasting emissions from traveling off-site in some cases.

In some quarries, shot rock (material broken by the blast) produced by a blast at one level must be moved to another level for processing. Depending on site-specific conditions, this may be done by loading the material into trucks for transport or dropping it off a ledge. The U.S. EPA published an emission equation relating the emission rate to factors that affect the emission rate. In this equation for ledge drop operations, one of the primary inputs accounts for wind speed. The emission factor increases with wind speed. All other things remaining equal, approximately four times as much PM_{10} is emitted at an average wind speed of 20 miles per hour as at five miles per hour.

A similar direct relationship exists for drop height. Twice the emissions result from a 40-foot drop as from a 20-foot drop. The relationship of moisture to PM_{10} emissions is more complicated. An increase in the moisture content from two percent to 12 percent would produce a 97 percent decrease in emissions. However, it is unlikely that quarry operators would be able to wet the rock sufficiently to achieve this moisture level. The drop height will be largely dictated by the physical limitations of the quarry even though quarry operators would be well advised to avoid ledge drop operations whenever possible. Where possible, increasing the moisture content of the material and carrying out these operations when wind speeds are low will decrease the amount of PM_{10} produced blasting or ledge drop operations.

Emissions from excavating rock and transporting it to process areas can be reduced by adding moisture. The following empirical equation is given for estimating PM_{10} emissions from truck loading using a front-end loader or power shovel.

$$E = (0.36)(0.0018)\frac{\left(\frac{s}{5}\right)\left(\frac{U}{5}\right)\left(\frac{H}{5}\right)}{\left(\frac{M}{2}\right)^{2}\left(\frac{Y}{6}\right)^{0.33}} \qquad (2)$$

where: E = emission factor, pounds per ton (lb/ton)
s = material silt content, (%)
U = mean wind speed, miles per hour (mph)
H = drop height, feet (ft)
M = material moisture content, (%)
Y = dumping device capacity, cubic yards (yd^3)

Equation 2 can also be used to estimate the control efficiency of adding moisture to the material. All other things held constant, we can estimate that at a moisture content of 12 percent the emissions can be reduced 97 percent relative to a moisture content of two percent (no moisture added). If we assume that typical quarrying practices result in a moisture content of five percent, increasing the moisture content to 12 percent would result in a reduction in emissions from truck loading and unloading of

495 pounds per year in our example quarry (see Chapter V). This would be an overall reduction in emissions of 39 percent. An additional reduction could be achieved if quarry operators ceased excavating when wind speeds were high. When hourly average wind speeds are 10 miles per hour, emissions from excavation are double what they are on days when average wind speeds are five miles per hour at the same moisture content.

In many small to medium sized quarries, excavation is not carried out at all times during the processing day. For these quarries, the suspension of activities during times of high winds may be feasible and not impose any additional costs.

2. Screening and Crushing

The emission factors for screening and crushing assume a moisture content of the material from 1.5 to 4 percent. This would represent typical wet suppression systems for reduction of nuisance dust. However, if additional water is not added to counter the creation of additional fines and reduction of moisture due to evaporation, emissions will increase as the material moves through the processing sequence. Since the amount of dust emitted is dependent on many site-specific conditions, we cannot quantify the potential emission reduction from installing and operating additional spraybars. The potential additional cost will depend on how many additional spraybars are needed. Each additional spraybar will cost about $750.00. The U.S. EPA indicates that direct spraybars are needed for control of crushing emissions but carryover may be sufficient for the other parts of the processing system unless visual observation reveals the need to add moisture at any other location in the processing system (U.S. EPA, 1995). Reduction of emissions beyond those estimated by the equation would require that additional moisture be added to the materials.

3. Conveyors and Drop Points

Based on site visits, the use of moisture to control emissions from conveyors and drop points is standard operating practice. Shrouds will provide additional emission reductions by reducing the effective wind speed at the drop point. However, we have not been able to quantify the potential reduction in wind speed. The empirical equations for estimating emissions from conveyor drop points take into account moisture content and average wind speed (U.S.EPA, 1995). The range of source conditions used in developing this equation included moisture content ranging from 0.25 to 4.8 percent and wind speeds from 1.3 to 15 miles per hour.

4. Material Storage and Exposed Areas

Storage pile emissions result from of both wind erosion from piles and the effect of equipment moving around, on, and in the vicinity of, storage piles. Watering is useful to reduce emissions from vehicle traffic near the storage piles. Watering of the storage piles typically only has a very temporary effect on overall emissions. A much more effective technique is to apply chemical agents such as surfactants that permit more extensive wetting. Continuous chemical treating of material loaded onto piles coupled with watering or treatment of roadways, can reduce total particulate matter emissions from aggregate storage operations by up to 90 percent. (U.S. EPA, 1995)

Additional control for wind erosion is accomplished by covering piles or screening them from winds. Enclosures are an effective means to control fugitive particulate matter from open dust sources. However, available data are not sufficient to quantify emission reductions. Studies of wind fences and other porous barriers such as trees have shown that they can effectively reduce wind velocity and consequently emissions but their effectiveness would have to be based on measurement of site-specific factors. Additional techniques for reducing emissions include confining activity such as removing materials from piles to the downwind side (U.S.EPA, 1992).

The use of chemical stabilizing agents such as polymers can effectively eliminate emissions from inactive storage piles or open areas for more than a year as long as the surface is not disturbed. The most effective methods for reducing emissions from an inactive area are covering the area with non-asbestos containing materials and re-vegetating.

5. On-Site Vehicle Traffic

The U.S. EPA lists the following control techniques for unpaved travel surfaces: (1) source reduction such as speed reduction, and/or traffic reduction, (2) source improvement such as paving, or surfacing with gravel, (3) surface treatment such as watering and/or chemical stabilization (U.S. EPA, 1992).

The emission control obtainable through the use of source reduction activities is readily calculated through application of the emission factor equation (Equation 1, Chapter IV). Paving is expensive and may not be a practical option for industrial plant roads subject to very heavy vehicles. The emission reductions attainable through covering the surface of haul roads with gravel is a result of substituting a material with a lower silt and asbestos content (which must be less than 0.25 percent as determined by an approved asbestos bulk test method) than the original surface. Because emissions are directly related to silt and asbestos content, any reduction of the silt content and/or the asbestos content will achieve an equivalent reduction in emissions. This option is less expensive than paving but will require periodic maintenance.

Surface treatments require periodic reapplication. Wet suppression is a temporary measure and may need to be reapplied several times an hour in hot summertime conditions. Chemical dust suppressants such as magnesium chloride and liginsulfonate require much less frequent reapplication. Frequency of application may be affected by track-on from adjacent untreated areas or spillage. The factors that impact the cost of application are the application rate, labor costs, frequency of application, and area to be treated. Over time, the efficiency of these measures will be decreased as a result of track-on and spillage on the treated surface. Increasing the freeboard in trucks and wetting and/or covering loads can reduce spillage, which affects control efficiency or frequency of reapplication. Over a period of time with continued application, treated surfaces can approach the level of emissions from paved roads.

6. Track-Out

Track-out emissions are caused by dirt deposited on the paved roadway and emitted to the air by traffic on the paved road at the quarry entrance. Material carried out on the tires and undercarriage of the trucks and spillage contribute to this source of emissions. There are two approaches to reducing track-out emissions. The first is prevention of the deposits on the paved road and the second is periodic cleaning of the paved road.

Very good control can be achieved if the deposits on the road are prevented. Spillage can be reduced by increasing the freeboard in truck loads and covering the load with tarps. Material carried out on the tires and undercarriage of trucks can be greatly reduced. Approaches to this objective range from paving to gravel pads to tire and/or truck wash systems. The effectiveness of any given measure can be estimated on a site-specific basis by measuring the silt loading on the paved surface at the access point.

The effectiveness of removing the deposits periodically will depend on the frequency of the cleaning operation and the traffic level on the paved road. Table VI-1, presented earlier, identifies the efficiency of various cleaning methods for paved roads.

VII. ECONOMIC IMPACTS OF THE PROPOSED ATCM

This chapter discusses the impacts that the proposed Airborne Toxic Control Measure (ATCM) may have on projects at existing homes, new home construction, dust mitigation at quarries and surface mines, and costs to local, state, and federal agencies. Overall, the proposed ATCM is not expected to result in any significant economic impacts. The overall cost impact of the proposed ATCM is estimated to be approximately $3 million to $5 million over five years or an average of $600,000 to $1 million per year. However, when considering the impact from the 2000 Asbestos Airborne Toxic Control Measure for Surfacing Applications (Asbestos Surfacing ATCM), three quarries may experience significant economic impacts.

For projects at existing homes, the additional cost of dust control is estimated to be $55 per project. The additional cost for new home construction, which is expected to apply to less than one percent of new homes constructed in California, would add less than 0.3 percent to the total project cost.

Cost impacts for quarries and surface mines are estimated to range from $500 to $7,000 in the first year and up to $1,600 averaged over five years. All of the affected quarries and mines are assumed to be small businesses. The highest costs would apply to quarries that produced aggregate with an asbestos content greater than 0.25 percent. These are the same quarries for which potentially significant impacts were identified due to the July 2000 adoption of the Asbestos Surfacing ATCM which prohibits the use of materials with an asbestos content greater than 0.25 percent for surfacing applications.

The proposed ATCM is not expected to cause a noticeable change in California employment, business status, and competitiveness. The proposed ATCM may actually create some business opportunities for California retailers and distributors that sell or rent dust suppression equipment and products.

No significant cost impacts were identified for public agencies. Dust control for road building projects is the current standard practice and is used to both minimize air emissions and to protect water quality. Costs for building construction done by public agencies are expected to be similar to those incurred by private construction projects.

A. Legal Requirements

Section 11346.3 of the Government Code requires State agencies to assess the potential for adverse economic impacts on California business enterprises and individuals when proposing to adopt or amend any administrative regulation. The assessment shall include a consideration of the impact of the proposed regulation on California jobs, business expansion, elimination or creation, and the ability of California business to compete with businesses in other states.

Also, State agencies are required to estimate the cost or savings to any State or local agency and school district in accordance with instructions adopted by the Department of Finance (DOF). The estimate shall include any non-discretionary cost or savings to local agencies and the cost or savings in federal funding to the State.

Health and Safety Code section 57005 requires the Air Resources Board (ARB) to perform an economic impact analysis of submitted alternatives to a proposed regulation before adopting any major regulation. A major regulation is defined as a regulation that will have a potential cost to California business enterprises in an amount exceeding ten million dollars in any single year. The proposed ATCM is not a major regulation.

B. Affected Businesses

Any construction, grading, quarrying, and surface mining business that disturbs the soil in areas that are geographically classified as being in a geographic ultramafic rock unit (GURU), or the area to be disturbed has serpentine, ultramafic rock or naturally-occurring asbestos would potentially be affected by the proposed ATCM. Also potentially affected are special trade contractors that do small projects such as landscaping, swimming pool installations, or the construction of add-ons. There are approximately 1,120 construction and grading companies that may operate in ultramafic or serpentine rock areas of the State. Also, there are 25 operating quarries and surface mines that operate in the same areas. These businesses fall primarily into four 2-digit industries as identified by Standard Industrial Classifications (SICs) and new North American Industry Classification (NAICs). A list of these industries that we have been able to identify is provided in Table VII-1.

Table VII-1. Industries with Businesses Potentially Affected by the Proposed ATCM

SIC/NAICS	Industry
14 / 2123	Mining and Quarrying of Nonmetallic Minerals, Except Fuel
15 / 233	Building Construction and General Contractors and Operative Builders
16 / 234	Construction Other than Building Construction - General Contractors
17 / 235	Construction - Special Trade Contractors

Since information on employment and shipment values are not available for quarries and surface mines from the State Mining and Reclamation Act (SMARA), we looked at information from the U.S. Census Bureau. According to the U.S. Census Bureau, there were 281 establishments in California that were engaged in nonmetallic mineral and quarrying mining operations in 1997. These mines and quarries shipped products valued at slightly over $1.5 billion. Also, there were over 60,000 construction establishments in California in 1997, of which about 19,000 were in general contracting, 3,200 in heavy construction, and 38,000 special trade contractors. These establishments generated over $93 billion in construction work (USCB, 2000). According to the SMARA, there are 799 mines holding active permits in the State of

California. This number includes mines and quarries that are not located in ultramafic rock units, are exempt sand and gravel operations, or do not produce aggregate for sale. The number of potentially affected mines is much lower. The ARB staff identified the potentially affected mines and quarries using the maps provided by the DOC and refined the estimate by calling the potentially affected quarries and mines and the districts in which they were located.

For the 2000 Asbestos Surfacing ATCM, staff's investigation identified only 17 that might have to do aggregate testing and only three of those that would experience a potentially significant economic impact due to the prohibition against selling aggregate with an asbestos content of 0.25 percent or greater.

C. Cost to Homeowners

1. Dust Mitigation Measures

The proposed ATCM has specific requirements for construction activities that would disturb an acre of land or less. These requirements specify keeping the soil adequately wet during excavation, stabilizing stockpiles when not adding or removing materials, cleaning equipment prior to moving it off-site, and cleaning visible track-out off the street. These requirements would apply to contractors doing small projects such as landscape or swimming pool installations or the construction of outbuildings or add-ons. These requirements are not expected to impose an unreasonable burden on homeowners or contractors.

In many cases, soil is easier to work when wet. Therefore, the practices that suppress dust emissions also make the job easier to do. For example, pre-wetting areas prior to digging postholes or trenches will soften the soil and make it easier to handle. Additionally, it is typical for swimming pool contractors to arrange for the area to be watered prior to excavating.

Compliance with this ATCM may require contractors to do some things that may not be universally practiced. Stabilizing stockpiles and washing equipment when it is moved off-site may not be routinely done. Cleaning up visible track-out is a good business practice but when the track-out contains asbestos it is necessary for public health reasons. We anticipate these additional requirements will take an additional 1.5 hours on any one of these small projects in which mechanized disturbance of the soil surface is required. We anticipate that 1 in 15 homeowners in the affected areas would hire a contractor to do one of these types of activities in any one year.

Extra water would be used to comply with these requirements. We estimate a contractor working on a small project for a homeowner would use 150 gallons of water to clean track-out off the street and from 50 to 150 gallons to clean off the equipment before it was moved off-site. Wetting the area to be disturbed might require the use of about 300 gallons per project. This would represent extra water use per project of 500 to 600 gallons. To estimate the cost of this extra water, ARB staff contacted seven water providers in three areas known to contain ultramafic rock in California. Water usage costs obtained from these providers ranged from 0.0011 to 0.0033 dollars per gallon (ARB, 2001e). Thus the estimated cost of water would be between $0.55 and $1.98 per project.

ARB staff estimated the number of affected homeowners based on the fraction of the area in each California county with ultramafic rock and the number of housing units in each county. The maps published by the Department of Conservation (DOC), Division of Mines and Geology were the basis for the estimate of the fraction of each county in ultramafic rock units. To estimate the number of existing housing units in each county, ARB staff started with the census data collected in the 1990 census because the data from the 2000 census is not yet available to the public. This was updated to 1999 using data from the DOF Economic Research Unit. For some counties this may overestimate the number of affected homeowners because we did not have sufficient information to adjust for multiunit residences. This overall approach rests on the assumption that housing is not differentially located in areas with ultramafic rock. In some areas, this may underestimate the number of affected homeowners and in others it may overestimate.

Based on the above data, ARB staff estimates 97,000 homes are in ultramafic rock areas. Based on the assumption that 1 out of 15 homeowners will have one of these types of projects done in a year, approximately 6,470 projects will be affected by these requirements each year. The total cost for the extra water will then be between $3,560 and $12,800 per year. The resulting estimate of the extra water needed per year is between 3.2 million gallons and 3.9 million gallons. If labor costs for dust control are $35 per hour, each project would cost an additional $52.50 in labor costs. The total annual labor cost would then be $340,000. Thus, the total annual cost of the proposed ATCM would be between $343,000 and $352,300.

2. <u>Cost from July 2000 Asbestos Airborne Toxic Control Measure for Surfacing Applications</u>

Homeowners who wish to purchase crushed aggregate to cover the surface of an unpaved driveway may experience a minimal economic impact from the 2000 Asbestos Surfacing ATCM. The cost to purchase crushed aggregate includes the cost of the material plus the cost of transportation when it is delivered. If the quarry nearest to the consumer cannot supply the material that does not contain asbestos, there may be an increase in the delivery cost.

Based on quotes from several hauling companies, staff estimated that if the round trip to the quarry were to increase by 30 to 45 minutes, the additional delivery cost would be $30 to $60. This is less than a 10 percent increase in the cost of the job. This is the highest incremental cost we should expect any individual to experience as a result of adoption of the proposed revisions to this ACTM. Most homeowners would experience no additional cost.

The alternative aggregate available to the homeowner will most likely be river rock or limestone. The cost for these alternatives is comparable to serpentine (the cost for limestone was quoted as $6.75 per ton). Both alternative aggregates have been found to be more durable in surfacing applications than serpentine and therefore, do not need to be replaced as often. Thus, over the lifetime of the surface, we believe the homeowner will experience no additional cost and potentially a cost saving.

D. Impacts on Home Construction Costs

The proposed ATCM would potentially impose additional costs on some businesses that are engaged in construction and grading operations associated with home construction. To estimate the number of construction and grading operations that may be impacted by this regulation, staff started with the number of new homes built in each county in 1999 and the fraction of the area in each county that was in a GURU. It is important to note that some of the home construction occurring today was approved in years prior to 1999 and therefore was not included in this calculation. Assuming that home construction projects are equally distributed on all buildable land, staff estimated the percentage of each county that is composed of serpentine and/or ultramafic rock using the DOC Geologic Map Sheets of California (1:250,000 scale).

Using information from the Construction Industry Research Board and DOF, staff determined the number of new housing units authorized by building permits in 1999 per county. In 1999, a total of 140,137 building permits were authorized in California (DOF, 2000). The number of housing permits per county was multiplied by the percentage of the area in ultramafic rock units in each county to estimate the number of housing units that may be built in ultramafic areas. This number was then summed for each county to get an estimation of the total new housing being built in ultramafic areas for all counties in California each year. Table VII-2 shows the permitted housing units and the fraction of the area in a GURU for each county.

We obtained an estimate of the additional cost incurred per lot by a development company working in a GURU and meeting the dust mitigation measures that would be required under the proposed ATCM, including the cost of developing an asbestos dust mitigation plan. This estimate was $400 to $500 per lot (ARB, 2001f). As a percentage of the grading cost, this is a 10 percent increase. As a percentage of lot preparation, this is a 2 to 3 percent increase. We believe this is an appropriate value to use for housing units developed within a subdivision.

ARB staff then developed an estimate of the cost per lot for complying with the proposed ATCM. Housing units built individually on a single parcel may incur lower or higher costs. Most of the cost of dust suppression is the cost of a water truck. On small lots with a readily available water source, dust suppression can be carried out with a water hose thus the cost would be less. On individual parcels without access to a water source, ARB staff estimates the cost at $200 per day assuming the project would disturb about one half an acre. This estimate is based on the use of a portable water trailer. The maximum estimate derived by ARB staff would be $1,500 for dust suppression assuming the rental of a water truck when one acre was to be excavated.

Table VII-2. Number of Housing Permits in Geographic Ultramafic Rock Units

County	1999 Housing Permits (A)	Percent Serpentine/Ultramafic 250K Map (B)	Calculation: Housing Permits in Serpentine/Ultramafic [C = (A*B)]
Alameda	4,511	0.02	90.22
Alpine	50	0.00	0.00
Amador	256	0.01	2.56
Butte	960	0.02	19.20
Calaveras	302	0.01	3.02
Colusa	48	0.05	2.40
Contra Costa	4,589	0.01	45.89
Del Norte	35	0.33	11.55
El Dorado	1,435	0.02	28.70
Fresno	3,032	0.05	151.60
Glenn	54	0.02	1.08
Humboldt	404	0.01	4.04
Imperial	333	0.00	0.00
Inyo	18	0.00	0.00
Kern	3,157	0.0001	0.32
Kings	493	0.01	4.93
Lake	165	0.02	3.30
Lassen	116	0.00	0.00
Los Angeles	14,383	0.00	0.00
Madera	619	0.00	0.00
Marin	736	0.01	7.36
Mariposa	74	0.02	1.48
Mendocino	270	0.01	2.70
Merced	1,003	0.00	0.00
Modoc	14	0.00	0.00
Mono	213	0.0001	0.02
Monterey	2,081	0.01	20.81
Napa	720	0.25	180.00
Nevada	815	0.01	8.15
Orange	12,348	0.00	0.00
Placer	4,896	0.01	48.96
Plumas	101	0.01	1.01
Riverside	14,579	0.00	0.00
Sacramento	7,743	0.00	0.00
San Benito	581	0.02	11.62
San Bernardino	7,072	0.00	0.00
San Diego	16,427	0.00	0.00
San Francisco	3,811	0.05	190.55
San Joaquin	4,046	0.00	0.00
San Luis Obispo	1,664	0.02	33.28
San Mateo	901	0.01	9.01
Santa Barbara	915	0.01	9.15
Santa Clara	7,010	0.01	70.10
Santa Cruz	506	0.0001	0.05
Shasta	809	0.0001	0.08
Sierra	14	0.0001	0.00
Siskiyou	154	0.10	15.40
Solano	1,953	0.00	0.00
Sonoma	3,052	0.05	152.60
Stanislaus	2,310	0.00	0.00
Sutter	183	0.00	0.00
Tehama	155	0.01	1.55
Trinity	46	0.10	4.60
Tulare	1,653	0.02	33.06
Tuolumne	194	0.05	9.70
Ventura	4,442	0.00	0.00
Yolo	1,465	0.00	0.00
Yuba	221	0.01	2.21
Total	**140,137**		**1182.26**

Per lot costs decrease from that maximum due to economies of scale when developing multiple lots.

The following is an example of the cost of dust suppression using an equation for determining water usage from the U.S. Environmental Protection Agency (U.S. EPA) (U.S. EPA, 1992). The example is given for excavation of an acre (4,840 square yards). We assume excavation will take 12 hours and the site will require wetting for 8 hours before excavation work is started. Using a factor of 0.2 gallons per square yard per hour, we estimate the amount of water required for dust suppression as follows.

(3) $$\text{Water usage} = \left(0.2 \frac{\text{gal}}{(yd^2)(hr)}\right)(4{,}840\,yd^2)(20\,hrs) = 19{,}360\,gal$$

Taking in consideration information on the cost of water supplied by a local county water agency and a truck to dispense the water, this one acre construction site could experience the cost shown in Table VII-3 for dust suppression.

Table VII-3. Cost of Dust Suppression for a Small and Large Construction Project

	Small Project (1 acre)	Large Project (4 acres)
Water usage	19,360 gallons	77,440 gallons
Water cost	$139	$226
Truck rental time	20 hours	20 hours
Truck rental cost	$1,300	$1,300
Total cost (cost rounded up to reflect incidentals)	$1,500	$1,600

Larger construction sites may require continued watering for other activities on the site or for erosion control. On a larger site, the watering equipment (a truck in this example) can be used more efficiently. Therefore, the cost of watering would be lower than in the example above for one acre. For example, if the area to be watered were four acres, the estimated cost would be $1,600 (Table VII-3). If split into eight lots, the cost would be $200 per lot.

The example above indicates that the cost for dust control during excavation at a construction site can range from $200 for a 0.5 acre (residential) site to $500 per acre as the site gets larger and the use of the watering equipment can be maximized. The average price of a home in California is more than $150,000 so these requirements would represent about 0.1 percent to 0.3 percent of the average home price, which represents a negligible impact.

Based on the estimate of 1,182 new housing units permitted per year in GURUs and a range of costs of $200 to $500 per unit, we estimate the costs will total between $236,400 and $591,000. The associated infrastructure can be expected to impose some additional cost. An estimate of the ratio of the area affected by housing construction to the area affected by commercial and industrial development is not readily available. However, based on monthly planning and building department activity and status reports for the fast growing city of American Canyon in Napa County, this ratio would be about eight percent (Miller, 2001). We believe this ratio would be less in rural areas. Adding eight percent for infrastructure construction, the total costs increase to between $255,000 and $640,000 per year.

E. Costs to Quarries and Surface Mines

If a quarry or surface mine is in a geographic ultramafic rock unit, it must submit an asbestos dust mitigation plan to the local air district describing the measures that will be taken to minimize emissions of naturally-occurring asbestos. The regulation lists the dust mitigation measures that must be implemented by the quarries and mines. The cost to develop an asbestos dust mitigation plan and have it approved by the district is estimated to be about $500. Currently, 14 of the 25 affected facilities have operating permits under the districts. All of these permits include some fugitive dust requirements.

Most quarries and mines use mitigation measures to reduce dust emissions. Among the most commonly used measures are road watering to reduce emissions from truck traffic, and spraybars on the conveyors to reduce dust emissions from crushing, screening, and conveying. If applied conscientiously, these measures reduce nuisance dust and are reasonably available control for areas that are not in serious non-attainment of PM_{10} standards (particulate matter less than ten microns in diameter). If additional spraybars are needed to meet the requirements of the proposed ATCM, the cost would be $750 per spraybar. Some very small operations not previously subject to district permitting requirements, may need to bring a water trailer or water truck on-site during quarrying operations to provide the needed process dust suppression. These would be the operations that do not operate a crusher. These facilities typically excavate and/or screen material only a few days per year. A water trailer filled with water costs $200 per day. Based on discussions with trucking companies, a water truck costs $65 per hour plus the cost of the water.

Quarries that process ultramafic rock for surfacing will have additional costs from the 2000 Asbestos Surfacing ATCM. These quarries that process ultramafic rock for surfacing are required to test their aggregate material to demonstrate that the material has an asbestos content of less than 0.25 percent. The Asbestos Surfacing ATCM requires testing every 1,000 tons of material produced. The estimated cost for testing is approximately $60 to $100 per test.

While most California quarries are able to withstand the impact of the Asbestos Surfacing ATCM without a significant impact on their revenues, there are three small quarries with a significant portion of their revenues coming from serpentine sold for use in unpaved surfacing applications. These three small quarries may be adversely impacted if they are unable to find alternative uses for their asbestos-containing materials. Staff believes the chances for such a scenario are high for one quarry, low for another, and unknown for the third quarry (because the quarry operator chose not to disclose the requested information to ARB staff).

1. Dust Mitigation Measures

On-Site Public Roads: Some mines and quarries have on-site public roads. Generally, these roads range from one quarter to one half mile in length. The proposed ATCM lists three options for controlling asbestos emissions from on-site public roads. Staff estimated a cost per mile for each of the three options using the following parameters.

Option 1: Covering the road with gravel that has an asbestos content less than 0.25 percent.

- If we assume a road width of 20 feet, and a gravel depth of three inches it would take 977 cubic yards of gravel per mile.
- If we assume the cost of producing and applying that gravel is $8.00 per cubic yard, the cost would be about $7,800 per mile.
- If the cost of purchasing that gravel from an alternate source and applying it to the road is $15.00 per cubic yard, the cost would be about $15,000 per mile.
- We assume about 10 percent would have to be added each year to replenish the covering.

Option 2: Applying a chemical dust suppressant to one-half mile of road. It is estimated that the cost would be $8,500 the first year and $3,500 each year thereafter (Howton, 2000). This is an upper bound estimate assuming that a contractor is hired to apply it. In some cases, the operator may already own the necessary equipment and be able to apply it for less.

Option 3: Paving the road with chip seal. The cost to chip seal a road is estimated to be $10,000 per mile (ARB, 2000c). Staff estimates that chip seal will last approximately five years.

Track-Out Onto Public Roads: The proposed regulation requires prevention and removal of track-out of asbestos-containing soil onto public roads. Methods for track-out prevention and control include manually sweeping the material off the road with a broom and a hose, using a street sweeper, and installing a gravel pad or other track-out prevention device at the end of the access road. The proposed ATCM requires installation of a track-out prevention device and cleanup of visible track-out at the end of the workday. The frequency with which cleanup will be required will depend on how well designed and maintained the track-out prevention device is, the quarry's production rate, the frequency and duration of the activity, and the time of year that the activity is being conducted.

Track-out removal: It is estimated that the manual removal of asbestos-containing material would be the cost of the time spent by an employee to do the sweeping, or approximately $35 per hour. The cost to rent a street sweeper is estimated at $107 per hour (ARB, 2001g). The site-specific conditions and the effectiveness of the track-out prevention measure used will determine the frequency and duration of use. For example, if a quarry rents a street-sweeper for one-half hour per week for 11 weeks, the average cost would be about $600 per year.

Track-out prevention: Based on information obtained from vendors, ARB staff made the following estimate for the cost of installing a gravel pad. The gravel pad should consist of a fabric filter underlay with three to six inches of gravel with diameters ranging from 1 to 5 inches (1:5 inch minor). The cost for a typical gravel pad was estimated based on the following costs:

Filter fabric	=	$0.24 to $0.40 per square foot
Rock	=	$10.00 to $25.00 per ton (1:5 minor)
Rock application	=	$3.00 per ton

For an area 2,000 square feet (an entrance and exit pad 20 feet wide by 100 feet long), a gravel pad six inches thick, with a fabric filter underlay and 1.5 inch diameter rocks would cost from $1,000 to $2,000. This estimate does not include the grading preparation and excavation cost since they would be part of the site work plan. Ten percent of the material would have to be replaced each year. This option would not be needed if paving has been chosen as a control option for on-site public roads. Table VII-4 shows the costs for each option.

Table VII-4. Summary of Costs

	Initial	On-going
Dust plan (review and development)	$500	$0
On-site public roads (one-half mile in length)[1]		
Option 1 (gravel)	$3,900-$7,330	$390-$730
Option 2 (dust suppressant)	$4,250	$1,750
Option 3 (chip seal paving)	$5,000	$0
Track-out prevention/Cleanup (one-half hour of time)		
Option 1 (street sweeper) (one-half hour per week for 11 weeks)	$600	$600
Option 2 (gravel pad)	$2,000	$200

1. Staff observations during site visits indicated one-half mile per quarry of on-site roads open to the public.

ARB staff has estimated a range of control costs for quarries and mines that represent the range of options available to the facilities. The ATCM allows the facility owner to work with the local air district to choose the options that best fit the facility. In an attempt to fit these options to the average facility, we have developed example scenarios based on observations by ARB staff during site visits.

Scenario 1: This scenario represents the smallest quarries which do not do any crushing, only excavate for a few days per year, and do not have public access roads on-site or access roads that directly intersect with a paved public road. These quarries already meet most of the requirements of the proposed ATCM, or the requirements are not needed for these facilities. We estimate that this scenario fits 3 of the 25 affected quarries.

Scenario 2: This scenario represents a facility that has process controls and that can choose lower cost options. This facility needs control for on-site roads and track-out prevention. We estimate that this scenario fits 20 of the 25 affected quarries.

Scenario 3: This scenario represents a facility that needs both on-site road and track-out prevention and for which the lower cost options are not available. We estimate that this scenario fits two of the 25 affected quarries. Scenario 3a assumes the quarry uses a chemical dust suppressant on on-site roads open to the public and a gravel pad for track-out prevention. Scenario 3b assumes the quarry paves the on-site roads open to the public and the paving doubles as track-out prevention.

Table VII-5 presents the estimated cost for the scenarios discussed above. These costs range from $500 for Scenario 1 to $6,750 for Scenario 3a. The total estimated cost over five years for the 25 affected quarries is presented in Table VII-6.

Table VII-5. Cost Scenarios for Quarries[1]

	Dust Plan	On-Site Road		Track-out Prevention		Total	
		Initial	Ongoing	Initial	Ongoing	Initial	Ongoing
Scenario 1	$500	$0	$0	$0	$0	$500	$0
Scenario 2	$500	$3,900 (option 1)	$390	$2,000 (option 2)	$200	$6,400	$590
Scenario 3a	$500	$4,250 (option 2)	$1750	$2,000 (option 2)	$200	$6,750	$1,950
Scenario 3b	$500	$5,000 (option 3)	$0	$0	$0	$5,500	$0

1. These cost scenarios can vary depending on the type of control measures chosen for each facility. Additional costs may apply if process control is needed.

Table VII-6. Total Cost for 25 Quarries

	Scenario Totals		Estimated Number of Facilities	Total	
	Initial	Ongoing		Initial	Ongoing Cost
Scenario 1	$500	$0	3	$1,500	$0
Scenario 2	$6,400	$590	20	$128,000	$11,800
Scenario 3a	$6,750	$1,950	1	$6,750	$1,950
Scenario 3b	$5,500	$0	1	$5,500	$0
			Total	**$141,750**	**$13,750**
			Total Cost Over 5 Years	**$196,750**	

Some very small operations will need to bring a water trailer or water truck on-site during quarrying operations to provide the needed process dust suppression. These would be the operations that do not operate a crusher. These operations typically excavate and/or screen material only a few days per year.

2. <u>Cost from July 2000 Asbestos Airborne Toxic Control Measure for Surfacing Applications</u>

The 2000 Asbestos Surfacing ATCM prohibits the sale and use of serpentine and asbestos-containing ultramafic rock for surfacing applications. Quarries that process ultramafic rock for surfacing would be required to test their material to demonstrate an asbestos content of less than 0.25 percent if the material is used in surfacing applications. Staff estimates testing costs to be approximately $60 to $100 per test ($19 to $30 sample collection, $10 sample preparation, $6 to $8 shipping, $25 to $50 sample analysis). The Asbestos Surfacing ATCM requires testing every 1,000 tons of material produced. Assuming $100 per test, the cost of testing would be $0.10 per ton of material produced for sale as surfacing material. If the material had an asbestos content of 0.25 percent or greater, the material could not be sold for surfacing and costs associated with potential loss of revenue may result. However, the material could be sold for uses other than surfacing if the material is covered and the material is accompanied with a written receipt explaining that the material contains asbestos and can not be used for surfacing or any application in which it would remain exposed and subject to possible disturbances (ARB, 2000).

Staff has identified three quarries that produce serpentine aggregate for unpaved surfacing applications. Information from two of the three affected quarries was used to calculate potential loss of revenue (the operator of the third quarry chose not to provide ARB staff with the information necessary to calculate its potential loss of revenue). The two affected quarries sell approximately 30,000 tons per year each of serpentine aggregate and the cost of serpentine for surfacing ranges between $5.25 to $7.00 per ton (Weber Creek, 2000). Quarry 1 sells approximately 10 to 15 percent of their serpentine aggregate for surfacing applications. The total potential loss of revenue for this quarry could range from $15,750 to $31,000 per year. Quarry 2 sells approximately 33 percent to 50 percent of its serpentine aggregate for surfacing applications. The total potential loss of revenue for this quarry could range from $52,000 to $105,000. The potential loss of revenue for Quarry 3 is unknown. Table VII-7 shows the potential loss of revenue for these quarries (ARB, 2000).

Table VII-7. Potential Loss of Revenue to Three Principally Affected Quarries

	Range	
	Low ($5.25 per ton)	**High ($7.00 per ton)**
Quarry 1 (10-15% surfacing)	$15,750	$31,000
Quarry 2 (33-50% surfacing)	$52,000	$105,000
Quarry 3	Unknown	Unknown
Total potential revenue loss	$67,750	$136,000

Table VII-8 shows the cumulative cost of both ATCMs. The three quarries that are significantly impacted under the Asbestos Surfacing ATCM would most likely fall into Scenario 3 under the proposed ATCM. This would be if the quarry chose to use gravel for track-out prevention for their on-site public roads and had to buy the gravel from another quarry. Scenario 3 would cost a quarry approximately $6,750 the first year and $1,950 every year thereafter. This cost is minimal when compared to the loss of revenue estimated from the Asbestos Surfacing ATCM.

Table VII-8. Cost Scenarios for Quarries from Both ATCMs[1]

	Dust Plan	On-Site Road		Track-out Prevention		Testing Costs		Total[2]	
		Initial	Ongoing	Initial	Ongoing	Initial	Ongoing	Initial	Ongoing
Scenario 1	$500	$0	$0	$0	$0	$100 per 1,000 tons	$100 per 1,000 tons	$3,500	$3,000
Scenario 2	$500	$3,900 (option 1)	$390	$2,000 (option 2)	$200	$100 per 1,000 tons	$100 per 1,000 tons	$9,400	$3,600
Scenario 3a	$500	$4,250 (option 2)	$1750	$2,000 (option 2)	$200	$100 per 1,000 tons	$100 per 1,000 tons	$9,750	$5,000
Scenario 3b	$500	$5,000 (option 3)	$0	$0	$0	$100 per 1,000 tons	$100 per 1,000 tons	$8,500	$3,000

1. These cost scenarios can vary depending on the type of control measures chosen for each facility. Additional costs may apply if process control is needed.
2. Based on information gathered by ARB staff, the 17 quarries potentially affected by the Asbestos Surfacing ATCM produce approximately 1,000,000 tons of aggregate per year statewide. Assuming that each quarry sells 50% of their aggregate production for surfacing applications, or 30,000 tons per year, the testing cost per quarry would be $3,000.

Based on information gathered by ARB staff, the 17 quarries potentially affected by the Asbestos Surfacing ATCM produce approximately one million tons of aggregate per year statewide. Staff assumed that half of this aggregate would be sold for surfacing applications based on limited information. This may be an over-estimate for quarries primarily serving urban areas. The total estimated cost of testing statewide would be approximately $51,000 per year. In comparison, the cost of the proposed ATCM for all 25 potentially affected quarries over five years is approximately $39,400.

F. Potential Impact on Employment

According to the U.S. Census Bureau, there were 281 nonmetallic mineral mining and quarrying establishments in California in 1997, employing 5,560 persons. Assuming that employment is uniformly distributed among all establishments, staff estimates each establishment had about 20 employees on average. Given the estimate of 25 affected quarries, we estimate about 500 employees in the mining and quarrying sector would potentially be affected by the proposed ATCM (USCB, 2000).

The Asbestos Surfacing ATCM economic analysis identified only three quarries that may sell a significant portion of their serpentine production for surfacing applications. These quarries may cut back their operations and lay off some employees if they are unable to find alternative uses for their asbestos-containing material. While these quarries might be impacted adversely by the Asbestos Surfacing ATCM, other mines and quarries that produce alternative material would potentially benefit as they experience increased demand for their material. This may actually result in the creation of some jobs.

The California construction industry employed over 561,000 persons in 1997. These employees working in over 60,000 establishments generated over $93 billion in construction work. Each establishment had 10 employees on average. Given the staff estimate of 1,120 affected construction and grading companies, we estimate approximately 11,200 employees would potentially be affected by the proposed ATCM. Thus, total affected employees would be 11,700. These employees account for two percent of total mining and construction employment in California. Thus, the proposed ATCM is unlikely to cause a noticeable change in California employment (USCB, 2000).

G. Potential Impact on Business Creation, Elimination, or Expansion

The proposed ATCM and the Asbestos Surfacing ATCM are not expected to have a noticeable impact on the status of California construction, grading, quarrying, and surface mining operations. The cost of the proposed ATCM is expected to be minor for most operations. This is because these operations are currently complying with most of the ATCM requirements under other state and federal fugitive dust requirements and as part of established best management practices.

For the Asbestos Surfacing ATCM, ARB staff was able to identify only three commercial quarries that sell a significant portion of their asbestos-containing materials for surfacing. These quarries may experience a reduction in revenue if they are unable to find alternative uses for their rock. It is possible, that at least one may have to cease operation.

The proposed ATCM may actually create some business opportunities for California retailers and distributors that sell or rent dust suppression equipment and products. These businesses may experience increased demand for their products and services. The Asbestos Surfacing ATCM may also create some business opportunities for mines and quarries that produce alternative materials. These mines and quarries may experience an increase in demand for their material as replacement for previously used serpentine or ultramafic rock.

H. Potential Impact on Business Competitiveness

The proposed ATCM would have no significant impact on the ability of California construction, grading, quarrying, and surface mining businesses to compete with similar businesses in other states. This is because most businesses are already complying with many of, if not all of, the requirements of the proposed ATCM under other state and federal fugitive dust mitigation rules or as part of established best management practices. These businesses are affected little by the proposed ATCM. Furthermore, these businesses usually operate locally. Most construction companies are small and lack financial sources to operate outside of their home territory.

The Asbestos Surfacing ATCM would have no significant impact on the ability of California quarries and surface mines to compete with quarries and surface mines in other states. This is because aggregate for surfacing applications is usually sold in areas close to the quarry. It is cost-prohibitive to transport aggregate great distances from a quarry. Thus, the vast majority of California quarries compete for business within California's borders. A few quarries located in the border areas between California and other states, however, may compete with the quarries located nearby in other states. Nevertheless, these interstate transactions are not expected to be significant.

I. Costs to Public Agencies

Because air districts will be implementing and enforcing this ATCM and the ATCM addresses building and road construction that may be done by or for public agencies, we evaluated the potential cost to public agencies. This section gives the conclusions ARB staff reached and the basis for those conclusions.

1. <u>Costs to Air Pollution Control and Air Quality Management Districts</u>

The proposed ATCM should have minimal economic impacts on districts. Health and Safety Code, section 39666 requires that after the adoption of the proposed ATCM by the Board, the districts must implement and enforce the ATCM or adopt an equal or more stringent regulation. Beginning in 2002, the districts, during their normal course of business, will be responsible for reviewing and approving asbestos dust mitigation plans for large construction projects, quarries, and surface mines located in geographic ultramafic rock units. The districts will also be responsible for enforcing the requirements of the ATCM.

Local air district responsibilities under the proposed regulation can be fully financed from the fee provisions authorized by section 42311 and 40510 of the Health and Safety Code. No reimbursement is required by either this proposed ATCM or the July 2000 Asbestos ATCM for Surfacing Applications pursuant to section 6 of Article XIIIB of the California Constitution. This is because the local air districts have the authority to levy service charges, fees, or assessments sufficient to pay for the program or level of service within the meaning of section 17556 of the Government Code.

a. <u>Quarries and Surface Mines</u>

Some districts require quarries and surface mines to apply for a "permit to operate." The requirements of the permits do include some dust control provisions although they may not be specific for controlling naturally-occurring asbestos. ARB has identified 25 operating quarries and surface mines that may be in geographic ultramafic rock units. Fourteen of the 25 quarries have operating permits and are inspected annually by the districts.

The statewide impact to the districts for quarries and surface mines will be the cost to review dust mitigation plans for 25 quarries and the cost to add inspections for 11 additional quarries. ARB staff estimates that review of an asbestos dust mitigation plan will take an average of two hours. An inspection of a facility takes an average of two hours plus driving time to the facility. The cost for district staff is estimated to range from $50 to $83 per hour (AQMD, 2000). The cost to review dust mitigation plans for all 25 quarries will range from $2,500 to $4,150. To add annual inspections for the 11 quarries without operating permits, the cost will range from $1,100 to $1,826. The total cost that the districts may incur for quarries is $3,600 to $6,000 (Table VII-9).

Table VII-9. District Costs for Quarries And Surface Mines

District Activity	Number of Sources	Number[1] of Hours	Low Cost[2] Estimate	High Cost[3] Estimate
Dust Mitigation Plan Review	25	50	$2,500	$4,150
Inspections[4]	11	22	$1,100	$1,826
Total			$3,600	$5,976

1. Assuming 2 hours per facility
2. $50 per hour
3. $83 per hour
4. Plus travel time

This total may double-count the estimated costs from the 2000 Asbestos Surfacing ATCM which amended the 1990 Asbestos ATCM to include quarries in ultramafic rock areas. This amendment did not change the inspection requirements but may increase the number of facilities being inspected. The evaluation of cost for the proposed ATCM includes the cost for the districts to add inspections for those quarries and surface mines that currently do not have a permit to operate. These may be the same quarries that the districts will have to add under the Asbestos Surfacing ATCM. Therefore, the costs described above may be double-counting district costs for quarries and surface mines.

b. Construction and Grading Operations

Construction and grading operations that are greater than one acre in size and located in a geographic ultramafic rock unit will need to file an asbestos dust mitigation plan with the local district. The impact to the districts for these operations will be the cost to review dust mitigation plans and the cost to conduct site inspections. ARB staff estimates that review of an asbestos dust mitigation plan will take an average of two hours. An inspection of a construction site takes an average of two hours plus driving time to the site. As previously stated, the cost for district staff is estimated to range from $50 to $83 per hour (AQMD, 2000).

Limited data were available to ARB staff to estimate the number of building projects that would need to obtain district approval for dust mitigation plans each year. ARB staff contacted planning and building departments in six counties known to have ultramafic rock. In rural counties and in the rural parts of urban counties, new housing is generally not built in subdivisions. In urban or suburban areas, 80 percent or more of the new housing is built in subdivisions. Staff expects new housing to be built in ultramafic rock areas will be built in urban and suburban areas as well as in rural areas. Staff is assuming that one-half of the new housing will be built in subdivisions. To estimate how many projects requiring asbestos dust mitigation plans would be started in a year, staff developed an estimate of the average number of houses per development during the initial build out. An estimate of 35 houses per development was based on data provided by El Dorado County and the City of American Canyon (Crummett, 2001; Miller, 2001). Using the assumption that 50 percent of the 1,182 new homes were built in subdivisions, and an average of 35 homes were built per subdivision, it is estimated that 17 projects need approved asbestos dust mitigation plans each year statewide.

We assumed that the majority of commercial and industrial projects built in ultramafic rock areas would be over one acre and thus require a district-approved asbestos dust mitigation plan. To derive an estimate for this, we assumed each of the 1,182 homes would require the disturbance of one-half acre or a total of 591 acres. Based on information provided by the City of American Canyon, ARB staff estimated that an additional eight percent of this area would be for commercial and industrial development, or 47 acres. ARB staff derived an estimate of the average area per project from the data provided by the City of American Canyon of 7.67 acres per project for a total of six additional projects per year needing asbestos dust mitigation plans. The total cost to the districts to review asbestos dust mitigation plans for construction projects is provided in Table VII-10.

Table VII-10. District Costs for Construction Projects

Type of Activity	Number of Projects	Cost for Plan Review[1]	
		Low Cost[2]	High Cost[3]
Housing Development	17	$1,700	$2,822
Commercial/Industrial Project	6	$600	$996
Total	23	$2,300	$3,818

1. Assumes 2 hours per plan
2. At $50 per hour
3. At $83 per hour

2. Costs to Road Departments

Based on discussions with 10 county public works departments, we anticipate that costs to road departments will be negligible because standard practices include dust control, track-out control, and speed restrictions. Some of these departments have the capability of identifying locations in GURUs and the rest said it would be made part of the contract specifications.

3. Cost to the California Department of Transportation

In meetings and telephone calls, staff of the California Department of Transportation (Caltrans) indicated that the cost of identifying the location of the affected sections of planned road building projects is insignificant. In addition, dust control and track-out control are part of the standard practices Caltrans follows to protect water quality. The cost of notifying the district is also negligible. Therefore we do not expect any significant fiscal impact for Caltrans road building projects.

Caltrans also occasionally contracts for building construction. If any of these projects were located in a GURU, the contractor would have to comply with the provisions of the ATCM regarding construction. This would add a small amount to the cost of a contract to build the project. However we can not estimate an overall cost to Caltrans because we can not anticipate how many, if any, building construction projects might be built in GURUs. Given that less than one percent of the housing projects are expected to be built in GURU's statewide and the cost per acre for dust mitigation is expected to be less than $1,500 and the cost for track-out prevention is expected to be $2,000 per project, we do not expect compliance to cause a significant fiscal impact. In addition, this is the same incremental cost any private sector developer would incur as the construction of buildings is not a uniquely governmental process.

Caltrans will incur some costs from the 2000 Asbestos Surfacing ATCM. The Asbestos Surfacing ATCM prohibits the use of serpentine aggregate on unpaved surfaces if the asbestos content is greater than 0.25 percent. Caltrans currently has 18,034 unsurfaced shoulder miles statewide on inventory. The repair cost for these shoulder miles in fiscal year 1999/2000 was $848,576. Approximately two percent of these miles are estimated to be within the boundaries of geological ultramafic rock formations. Caltrans estimates that there will be a five-percent increase in the cost of materials used to maintain these shoulders due to the implementation of the ATCM (cost to purchase non-ultramafic cover materials and testing). Therefore, the cost of the Asbestos Surfacing ATCM will be approximately $20,000 per year (Caltrans, 2000).

4. Cost to the California Division of Forestry (CDF)

Staff of the California Division of Forestry (CDF) reports that their current dust control practices when building and maintaining roads are identical to the requirements of the ATCM. The CDF does not routinely install track-out control but estimates the cost would be minimal and the ATCM would have very little impact on the agency (ARB, 2001a).

CDF will, however, incur a cost from the 2000 Asbestos Surfacing ATCM. The CDF maintains unpaved service and fire roads in the State Forests. CDF uses State specified base rock and native material for maintaining these roads. CDF staff believes that they do not have any serpentine quarries. CDF may incur costs to test the native material they use. This cost is estimated to be approximately $1,000 per year.

5. Cost to the California Department of Parks and Recreation

The California Department of Parks and Recreation (DPR) has no quarrying or surface mining operations. They do currently use water to suppress dust emissions when constructing and maintaining roads. They currently do not install track-out control but could implement the practice for relatively little cost. DPR staff do not expect the ATCM to have any significant impact on the agency (ARB, 2001b).

DPR will, however, incur a cost from the 2000 Asbestos Surfacing ATCM. The DPR maintains unpaved service and fire roads in State Parks. DPR may have a few limited sources of local aggregate that is used to these maintain roads and may incur costs to test this material for ultramafic rock. Other costs from the ATCM should be minimal. The cost to DPR is estimated to be $1000 per year for testing.

6. Cost to the Federal Agencies (BLM and Forest Service)

Staff of the Bureau of Land Management (BLM) reports that road maintenance is typically done when the roads are still wet with natural moisture. However, if work must be done on a road in the dry season and when building new roads, it is standard practice to use water or dust suppressants for dust control. Roads are typically covered with gravel where they intersect with paved public roads. Speed control has not been part of their standard practices in the past but could be implemented at a minimal cost. The staff geologist can identify areas that would be subject to the requirements of the ATCM. Therefore, we do not expect compliance with the ATCM to have a significant cost impact for the BLM (ARB, 2001d).

ARB contacted staff of 5 of the 18 National Forest Offices in California and the Regional Office of the U.S. Forest Service (USFS). The regional office has a geologist on staff and some forests report having more detailed maps of the serpentine occurrences than the DOC. USFS staff also reported that only seven miles of new roads were constructed on USFS lands in California last year. The regional office says they do not use serpentine aggregate and that they gravel 10 feet of road where unpaved roads intersect paved roads. Two reported that they used pavement for track-out control at intersections. All agreed that roads needed to be wet to be workable. Most do the road maintenance when the roads are still damp with natural moisture. It is not a typical practice to use a water truck for dust control. Most USFS roads are in remote locations so we assume that that there could be a small cost to obtain remote location exemptions. Where remote location exemptions are not granted, dust control and track-out control appear to be standard practice and may be required as best management practices for water quality control.

One National Forest office states that there are at least 17 gravel pits in mapped ultramafic rock deposits. These pits would be subject to the requirements for quarries and surface mines and would require a dust mitigation plan. The pits would require process control when work was going on and treatment of the on-site public roads. These costs would be similar to those estimated for privately-owned quarries. Control for processing is estimated to cost $200 per day. If the Forest Service tested the rock and found that it was less than 0.25 percent asbestos, the cost for control of roads open to the public would be between $3,900 and $5,000 the first year and between $0 and $1,750 in subsequent years. If the rock was not tested or was found to have an asbestos content of 0.25 percent or greater, the cost per quarry for the control of roads open to the public, would be between $5,000 and $7,330 the first year and between $0 and $1,950 in subsequent years. These cost estimates incorporate the assumption that the pits do not have an exit onto a paved public road. It is possible the costs could be reduced further if the on-site roads were closed to the public. Therefore, the economic impact on this forest could be up to $10,300 over five years.

VIII. ENVIRONMENTAL IMPACTS OF THE PROPOSED ATCM

The intent of the proposed Airborne Toxic Control Measure (ATCM) is to protect the public health by reducing the public's exposure to naturally-occurring asbestos. An additional consideration is the impact that the proposed ATCM may have on other areas of the environment. Based on the available information, the Air Resources Board (ARB/Board) has determined that no significant adverse environmental impacts are expected to occur with the exception that there may be small increases in emissions of diesel particulate matter, carbon monoxide, nitrogen oxides, and hydrocarbons from heavy duty diesel vehicles. (This potential impact is discussed below in Part D.) ARB staff evaluated increased use of water, increased emissions of diesel particulate, potential water quality impacts, and additional electricity usage for complying with this ATCM. Small increases in the use of electricity and water are expected. While these may be considered adverse environmental impacts, they are not expected to be significant. There will be reductions in emissions of asbestos and particulate matter to the ambient air. No adverse impact on water quality is expected. In evaluating these impacts, ARB staff evaluated the individual impacts of this proposed ATCM and considered the cumulative impact of this proposal and the estimated impacts of the July 2000 Asbestos ATCM for Surfacing Applications as described in the Initial Statement of Reasons for the Proposed Amendments (ARB, 2000).

A. Legal Requirements Applicable to the Analysis

The California Environmental Quality Act (CEQA) and ARB policy require an analysis to determine the potential adverse environmental impacts of proposed regulations. Since the ARB's program involving the adoption of regulations has been certified by the Secretary of Resources (see Public Resources Code section 21080.5), the CEQA environmental analysis requirements are allowed to be included in the Initial Statement of Reasons for a rulemaking in lieu of preparing an environmental impact report or negative declaration. In addition, the ARB will respond in writing to all significant environmental issues raised by the public during the public review period or at the Board hearing. These responses will be contained in the Final Statement of Reasons for the proposed ATCM.

Public Resources Code section 21159 requires that the environmental impact analysis conducted by ARB include the following: (1) an analysis of the reasonably foreseeable environmental impacts of the methods of compliance; (2) an analysis of reasonably foreseeable feasible mitigation measures; and, (3) an analysis of reasonably foreseeable alternative means of compliance with the proposed revisions to the ATCM. Regarding reasonably foreseeable mitigation measures, CEQA requires an agency to identify and adopt feasible mitigation measures that would minimize any significant adverse environmental impacts described in the environmental analysis.

B. Additional Water Use

An upper bound estimate of water use was made using the following assumptions:

- All the water used for dust control on affected construction sites was for the purpose of complying with this ATCM; and
- All the water used in quarries to control emissions from excavation, for watering roads and stockpiles and for track-out removal was due to the requirements of this regulation (except for a quarry in which road cleaning is a condition of the county use permit). No additional water use for controlling emissions from the rock processing plant was estimated unless the quarry was not required to control these emissions in an air quality permit or a county use permit.

The environmental impact analysis for the revisions to the 2000 Asbestos ATCM for Surfacing Applications did not include any increased use of water as a result of that ATCM. Therefore, the cumulative impact analysis for additional water use consists only of the additional water use estimated for this proposed ATCM.

To estimate the amount of water that might be used for cleaning track-out off the paved public roadway, we estimated the area of roadway that would have to be cleaned and the average number of operating days per year for the potentially affected quarries. The average number of operating days per year was estimated using aggregated production figures for those quarries that produced aggregate, were currently operating, and have quarry exits onto a paved public road based on the Surface Mining and Reclamation Act (SMARA) records and site visits. Assuming an average production rate of 1,000 tons per day, the average quarry would need to do road cleaning 55 days per year if the track-out prevention device did not prevent visible track-out. The area was calculated using a 20 foot lane width by a 100 foot length. The amount of water needed to accomplish cleanup is 0.48 gallons per square yard (see Table VI-1). These factors yield an estimate of 107 gallons of water per cleanup and a total water use for 19 quarries (five do not directly access a paved public road and street cleaning is required for one as part of the County use permit) of 112,000 gallons per year. Water usage for fugitive dust control was based on a factor of 0.2 gallons per square yard per hour (U.S. EPA, 1992), the estimated average number of operating days of 55 at eight hours per day, and an area of three acres per quarry. Therefore, the total additional water use for mines and quarries would be 32 million gallons of water per year.

The United States Geological Survey (USGS) reports the water use in mining in 1995 for California was 229 million gallons per day (USGS, 1998). The water use attributable to this ATCM is approximately 87,825 gallons per day (an increase of 0.04 percent).

Water use for construction projects was calculated as shown in Chapter VII. The total water use for small projects at existing homes is expected to be between 3.2 and

3.9 million gallons per year. The total water use for new construction is expected to be 12.5 million gallons based on an estimated half acre of area needing control per new home and an eight percent factor of commercial and industrial development. The total additional water use for construction projects comes to 15.7 to 16.4 million gallons per year. To put this total into perspective, ARB obtained estimates of water use for the State of California. In the 1998 California water plan update, the Department of Water Resources (DWR) estimates 1995 average year water use of 79,490 thousand acre-feet. Of that, 8,770 thousand acre-feet was estimated to be urban water use (DWR, 1998). Urban water use includes residential, commercial, industrial, and institutional uses. The anticipated increase in water usage for asbestos control at construction sites due to this ATCM, is about 0.0006 percent of the total urban water use for an average year. In a drought year, urban water use goes up by about 2.7 percent and it is likely that water use to comply with this measure would go up by a similar amount.

Adding the total estimated water use by quarries of 32 million gallons of water per year, and the total estimated water use for construction projects of 15.7 to 16.4 million gallons per year gives a total estimated water use for compliance with this proposed regulation of approximately 48 million gallons of water per year.

Neither CEQA nor the CEQA guidelines (Appendix E) describe specific thresholds for determining the significance of a potential impact such as increased water use. Instead of dictating a one-size-fits-all approach, CEQA authorizes public agencies to adopt by ordinance, resolution, rule, or regulation their own objectives, criteria, and procedures for the evaluation of projects (see Public Resources Code, section 21082). To date, ARB has not adopted thresholds of significance. For purposes of this analysis, ARB will rely on the thresholds of significance adopted by the South Coast Air Quality Management District. Under this criteria a project is considered to have significant adverse water demand impacts if the project increases demand for water by more than 5 million gallons per day or if the project requires construction of new water conveyance infrastructure.

Since the projected increase in water use for the proposed ATCM is 48 million gallons of water per year (132,000 gallons per day) it clearly does not meet this threshold. Infrastructure will be built to these sites but that is not a result of this proposed ATCM but rather of the development itself. The current infrastructure would be adequate to meet the needs for dust control resulting from the proposed ATCM. Therefore, staff concludes that the additional water usage is not a significant impact.

C. Potential Water Quality Impact

Water quality is not expected to be adversely impacted because the proposed dust control measures are consistent with the best management practices established by the Water Quality Control Board.

In addition to being a water-quality requirement, the best management practices with regard to water use for dust control are common sense. Sources are unlikely to apply so much water that it causes run-off because sopping wet soil is difficult to work in. Additionally, the use of excess water increases the cost of the project.

D. Additional Electricity Use

Pacific Gas and Electric Company (PG&E) indicates that a general rule of thumb for electricity used to pump water either from a well or an impoundment is that the pump will use about one kilowatt per horse-power (PG&E, 2001). Technical specifications for water pumps indicate that pumps ranging from 2 to 5.5 horsepower can pump about 25 gallons per minute (Megator, 2001). Based on these factors, it takes one kilowatt-hour to pump between 273 to 750 gallons. Municipal water systems often can deliver the water for much less. The California Energy Commission (CEC) highlights one such system that is so energy efficient it can deliver 9,460 gallons per kilowatt-hour. The total estimated additional water use attributable to this ATCM is 48 million gallons per year. Therefore, the total additional electricity potentially needed to comply with this ATCM is between 64,000 kilowatt-hours per year and 176,000 kilowatt-hours per year. CEC reports that total electricity consumption in California in 1999 was 252,800 Gigawatt-hours (million kilowatt-hours) per year (CEC, 2001). Thus, the additional electricity use attributable to this ATCM is less than one millionth of the total used in the State.

The environmental impact analysis for the revisions to the 2000 Asbestos ATCM for Surfacing Applications did not estimate any increased use of electricity as a result of that ATCM. Therefore, the cumulative impact analysis for additional electricity use consists only of the additional electricity use estimated for this proposed ATCM.

E. Potential Hazardous Waste Impact

In the analysis of impacts for the Asbestos ATCM for Surfacing Applications, staff anticipated a reduction in the demand for materials that contain asbestos and might otherwise be used for surfacing. This reduction was anticipated to result in decreased production and use of asbestos-containing material, and a corresponding decrease in the creation of asbestos-containing waste material from these activities. The proposed ATCM is not expected to have any impact on the production of hazardous waste.

F. Diesel Emissions

An increase in diesel emissions can be expected from additional travel of a diesel water truck to keep construction sites and quarries wet. For the construction sites, if a water truck can be used to water 4 acres operating continuously at a maximum speed of 15 miles per hour, and excavation and grading activity takes 20 hours per acre, the total miles traveled would be 75 miles per acre. If we estimate that development on areas covered by the proposed ATCM will total 648 acres per year, the total miles traveled to comply with this part of the ATCM would be 48,600. If we have 25 potentially affected quarries, operating an average of 55 days per year, eight hours per day, and the truck is used to keep an average of three acres per quarry wet, the total miles traveled would be 165,000 miles. ARB has estimated that water trucks would be considered heavy heavy-duty diesel vehicles and a fleet average emission factor for heavy heavy-duty vehicles traveling 15 miles per hour would be 1.042 grams of particulate matter per mile (ARB, 2001). The total estimated emissions of diesel particulate attributable to this ATCM are 491 pounds per year. ARB estimates particulate matter emissions from heavy heavy-duty trucks to be 13.59 tons per day and particulate matter emissions from all diesel trucks to be 19.72 tons per day (ARB, 2001). An additional 500 pounds per year of diesel particulate matter is clearly very small.

Using emission factors from the Emfac2000 model, staff also calculated emissions of hydrocarbons, carbon monoxide and oxides of nitrogen. The regulation is expected to result in statewide increases in hydrocarbon emissions of 6,100 pounds per year, carbon monoxide of 3,700 pounds per year, and oxides of nitrogen of 9,800 pounds per year. These are equally small compared with the statewide total emissions from mobile sources of 2,100 tons per day of hydrocarbons, 17,900 tons per day of carbon monoxide, and 2,100 tons per day of oxides of nitrogen (ARB, 2001h).

Staff also considered the cumulative impacts of the proposed ATCM, together with the impacts of the ATCM for surfacing applications that the Board approved in 2000. For both ATCMs, the only adverse impacts identified by staff are slight increases in emissions of diesel particulate matter, carbon monoxide, nitrogen oxides, and hydrocarbons from heavy-duty diesel vehicles. As shown in Table VIII-1, the environmental impacts estimated for the ATCM for surfacing applications were statewide emissions increases of 100 to 200 pounds of diesel particulate matter, 200 to 400 pounds of carbon monoxide, 2000 to 4000 pounds of nitrogen oxides, and 200 to 400 pounds of hydrocarbons. If one adds the emissions increases from the ATCM for surfacing applications to the emissions increases from the proposed ATCM, the cumulative statewide emission impacts of the two ATCMs are still extremely small.

Table VIII-1. Evaluation of Diesel Emissions (pounds per year)

Pollutant	2000 Surfacing ATCM[1]	Proposed ATCM[2]	Cumulative Total
Diesel Particulate Matter	100-200	491	591-691
Carbon Monoxide	200-400	3,700	3,900-4,100
Nitrogen Oxides	2,000-4,000	9,800	11,800-13,800
Hydrocarbons	200-400	6,100	6,300-6,500

1. Emissions from on-road gravel trucks calculated using EMFAC7G.
2. Emissions from off-road water trucks calculated using EMFAC2000.

Nevertheless, the emissions increases described in Table VIII-1 could still constitute an adverse environmental impact if one takes a very conservative approach. Staff evaluated a number of alternatives to this ATCM (see Chapter V, section C). However, staff was not able to identify any feasible alternatives that would substantially reduce the potential adverse impacts of this ATCM while at the same time ensuring that the positive environmental impacts (i.e., a reduction in exposure to asbestos emissions) would be achieved. Staff was also unable to identify any feasible mitigation measures that would substantially reduce the potential adverse impacts, while at the same time ensuring that the positive environmental impacts would be achieved. Staff believes that reducing asbestos exposure is a consideration that overrides the very small adverse impacts that may occur as a result of both the 2000 Asbestos ATCM for Surfacing Applications and the proposed Asbestos ATCM for Construction, Grading, Quarrying, and Surface Mining Operations.

G. Reasonably Foreseeable Alternative Means of Compliance with the ATCM

The ARB is required to do an analysis of reasonable foreseeable alternative means of compliance with the ATCM. Alternatives to the ATCM are discussed in Chapter V. ARB staff has concluded that the proposed regulation provides the greatest degree of flexibility and the least burdensome approach to reducing public exposure to emissions of naturally-occurring asbestos from construction, grading, quarrying, and surface mining operations consistent with protection of public health.

H. Environmental Justice

The ARB is committed to evaluating community impacts of proposed regulations, including environmental justice concerns. Because some communities experience higher exposures to toxic pollutants, it is a priority of the ARB to ensure that full protection is afforded to all Californians. The proposed ATCM is not expected to result in significant negative impacts in any community. The proposed ATCM is designed to reduce emissions of asbestos-laden dust in those geographic areas within ultramafic rock units. The result of the regulation will be reduced exposures to potential asbestos emissions for all communities in these areas, with associated lower potential health risks.

I. State Implementation Plan Impacts

The proposed regulation is expected to result in some reductions in particulate matter emissions. This will contribute to progress toward compliance with the air quality standards for particulate matter. We are unable to quantify this potential reduction in particulate matter due to the variability in current dust control practices used for these activities.

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