Development and Dissemination of an Educational Program for the Non-Regulated Community on Naturally-Occurring Asbestos in Serpentine Soils

Rachel Elkins, County Director/Master Gardener Advisor and Julie Frazell, 4-H Youth Development Program Representative, UCCE Lake County;
Bob Reynolds, Air Pollution Control Officer and Ross Kauper, Deputy Air Pollution Control Officer

A Joint Project of

Lake County Air Quality Management District

University of California Cooperative Extension

Purpose of the Project

- Create partial funding to support .5 FTE of the Lake County UCCE 4-H YD Program Representative position (2003-2004 Fiscal year)
- Address an emerging community concern:
  - Possible Risk of Disease Associated with Repeated Exposure to Asbestos-Containing Rock, Soils or Dust
- Provide information to other interested UCCE offices, public agencies and the non-regulated public

Project Methodologies

- Identified, obtained and compiled relevant existing public awareness information
- Created an educational packet to assist in identifying and mitigating serpentine hazards
- Developed the Serpentine Demonstration Garden at the Lake County Agricultural Center
- Conducted a media outreach program
- Produced digital presentation describing the issues related to serpentine hazards and mitigation
- Compiled a mailing list of affected property owners and mailed out educational packets, including a program evaluation with before and after questions
- Conducted public workshops for target audiences e.g. realtors, homeowners associations, contractors and the general public located in or near serpentine areas
- Lake County AQMD created transportable and deployable serpentine information display

Outcomes

- Received $19,500 to support the 4-H YD Program Representative (matched with $5,200 from the NCMR office)
- Received $4,600 for the Master Gardener Serpentine Demonstration Garden
- Established new UCCE-UC Campus relationships
- Gained valuable networking and visibility for UCCE programs
- Put UCCE in a leadership position on an emergency public health/natural resources issue

Project Collaboration List

University of California

UCCE Lake County
Harry Hoes
Master Gardener

UCCE Lake County
Dave Vierra
Master Gardener

UC Berkley
School of Public Health
James Meyers
CE Ag & Environ Health Specialist

UC Davis
Land, Air and Water Resources
Anthony "Toby" O'Geen
CE Soil Resource Specialist

Other Agencies

American Lung Association
Jenny Bard
Communications Specialist

California Air Resource Board
Richard Boyd
Section Manager

City of Clearlake
Karen Mantele
Planning Director

City of Lakeport
Richard Knoll
Planning Director

El Dorado County AQMD
Marcel McTaggert
Air Pollution Control Officer

Greater Lakeport Chamber of Commerce
Melissa Fulton
Executive Director

Lake County Board of Realtors
Renee Coffeen
Executive Officer

Lake County Environmental Health
Ray Ruminski
Director

Lake County Information Technology
Lon Sharp
GIS Specialist

Lake County Planning Division
Mary Jane Fagalde
Planning Director

Lake County Planning Division
Melissa Floyd
Resource Planner

Lake County Farm Bureau
Chuck March
Executive Director

Mendocino County AQMD
Dean Wolbach
Air Pollution Control Officer

USDA Bureau of Land Management
Richard Burns
Field Office Manager

USDA Natural Resources Conservation Service
Len Kashuba
District Conservationist

Facts About Rock and Soil in Lake County Containing Asbestos

What you need to know if serpentine soil or rock containing asbestos is located on your property

Clarkia also known as "Farewell to Spring"

Information from the
Naturally Occurring Asbestos in Serpentine Soils Education Program

A Joint Project of:
Lake County Air Quality Management District and **University of California Cooperative Extension of Lake County**

What Is Serpentine?
Serpentine is a common term used for a specific type of rock that forms when rocks and sediment are heated and compressed under the earth's crust. It often contains white streaks of minerals known as asbestos. **Asbestos fibers are a known human health risk.** The most common form of asbestos fiber found in Lake County is *chrysotile*. If rock or soil containing asbestos is located on your property or was used to construct your driveway or walkways, there is a risk of asbestos exposure where you live.

How to Recognize Serpentine Landscapes
Serpentine is California's State rock and forms distinctive grasslands and chaparral areas throughout Lake County. Serpentine rock is a distinctive shiny greenish-gray color. Plants growing in soils derived from serpentine rock often have a stunted or "bonsai" appearance. Plant growth may also be sparse due to the lack of vital nutrients.

What are the Health Concerns?
People may inhale or swallow dust containing asbestos fibers. The fibers can cause cancer and other diseases by remaining in the lungs or traveling to the lining of the lungs or abdominal cavity. It may be 20 or more years before disease caused by asbestos develops. Smokers have an increased risk of lung cancer when exposed to asbestos.

No "Safe" Level of Exposure to Asbestos Has Been Established
Any exposure to asbestos fibers involves some risk of disease. Health risk depends upon how often and to what degree one is exposed to asbestos fibers. No one knows how many fibers are needed to cause lung cancer or other diseases. Heavy and frequent occupational exposures are more likely to cause disease than non-occupational.

How are People Exposed to Asbestos Fibers?
Asbestos fibers are tiny and, once disturbed, may settle on the soil surface or become airborne. Natural erosion and routine activity can expose or release dust that contains asbestos fibers.

- Disturbing dry soils can create dust containing asbestos fibers.
- Storm water runoff can concentrate fibers; which may become airborne when dried.
- Asbestos fibers are exposed to the surface of the soil by wind, rain, and natural land movement.

Children Have a Higher Health Risk

- They spend more time playing outdoors.
- They have a faster breathing rate.
- Exposure at a young age may lead to disease earlier in life.

How Can You Reduce Your Exposure to Asbestos Dust?
Avoid the following activities when serpentine soil is dry and dusty:

- Rototilling, digging, grading, or plowing
- Using leaf blowers
- Driving on unpaved roads or driveways
- Riding horses or moving livestock

To Control Dust Around Your Home, Always

- Pre-soak dry ground thoroughly before disturbing the soil.
- Use water to clean sidewalks and driveways.
- Avoid using or cover unpaved surfaces.

Landscaping Can Reduce Exposure of Asbestos Fibers

- To reduce natural erosion and dust, cover gardens and yards with serpentine-tolerant plants and a 3- to 6-inch layer of organic mulch or asbestos-free soil.
- Water plants often in the first few years or until plants are well established.

How Fibers May Enter the Home

- Asbestos fibers can be tracked onto the home on shoes. Remove and clean shoes before entering house.
- Fibers can settle on clothing. Wash exposed clothing separately.
- Asbestos fibers can be transferred to family members by pets.

If Asbestos Fibers May Have Been Brought into the Home
Take care when:

- Sweeping, vacuuming
- Dry cloth dusting, feather dusting

Replace with:

- Damp cloth dusting, wet mopping
- Washable area rugs
- HEPA filter vacuum

Living with Serpentine Soils
Serpentine soils are an important natural resource of Lake County. They support a wide range of unique and rare plant and animal life. Taking simple and common sense precautions will ensure that residents and soils can safely exist together. Serpentine soils or rock should be left undisturbed and stabilized to reduce exposing or releasing fibers into the environment. As long as fibers remain bound in rock or soil, they pose very little health threat.

Information compiled by:
Julie Frazell, Program Representative; Rachel Elkins, County Director/Farm Advisor; University of California Cooperative Extension, Lake County, California.

Project funded by:
Lake County Air Quality Management District.

Acknowledgments: California Air Resources Board, California Geological Survey, Lake County Air Quality Management District, and University Of California McLaughlin Reserve

For more information on asbestos-containing soils and landscapes, send in this form or visit:

University Of California Cooperative Extension Asbestos Serpentine Soils Education Program
883 Lakeport Blvd.
Lakeport, CA 95453
PH: 707/263-6838
Fax: 707/263-3963
E-mail: celake@ucdavis.edu
Web-site: *http://celake.ucdavis.edu*

Please mail the following additional information to:

Name: _____
Address: _____
City: _____ State: _____
Zip Code: _____
Phone: _____

- ☐ Health risk related to asbestos
- ☐ How to landscape and stabilize serpentine soils
- ☐ Serpentine tolerant plant list
- ☐ Soil testing for serpentine soils and asbestos
- ☐ Indoor testing for asbestos

Lake County Serpentine Landscape Demonstration Garden

Clarkia also known as "Farewell to Spring"

A Joint Project of
Lake County Air Quality Management District
and
University of California Cooperative Extension Master Gardeners of Lake County

The Lake County Serpentine Landscape Demonstration Garden was developed to teach residents and visitors about the unique plants that grow in serpentine soils, one of Lake County's most prominent soil types. These soils are derived from Serpentine, California's State rock. Outcroppings of this shiny greenish-gray rock, along with associated plants such as gray pine, toyon, Clarkia wildflowers and others, may be seen along major highways and roads throughout the county.

The Demonstration Garden displays local plants that commonly grow in serpentine soils, as well as others that tolerate the unique physical and chemical make-up of serpentine soils. The garden also features gardening practices that will reduce exposure to asbestos, one of serpentine soils' natural occurring components.

Thank you for your interest in the Lake County Serpentine Landscape Demonstration Garden. Please come visit its ever-changing landscape.

Plants of the Demonstration Garden
Each plant is labeled with a corresponding number to the following plant list.

1) **McNab Cypress**, *Cupressus macnabiana*
2) **Bay Laurel**, *Umbellularia californica*
3) **Canyon Live Oak**, *Quercus chrysolepis*
4) **Oracle Oak**, *Quercus morehus*
5) **Toyon**, *Heteromeles arbutifolia*
6) **Styrax,** *officinalis var.californica*
7) **Coulter Pine**, *Pinus coulteri*
8) **Gray Pine**, *Pinus sabiniana*
9) **Holodiscus,** *Holodiscus* sp. (*shangra la*)
10) **Sargent Cypress**, *Cupressus sargentii*
11) **Flannel Bush**, *Fremontia californica*
12) **Buckeye**, *Aesculus californica*
13) **Coffee berry**, *Rhamnus californica*
14) **Holly-leafed Cherry**, *Prunus ilicifolia*
15) **Serpentine Columbine**, *Aquilegia eximia*
16) **California Fuschia**, *Zauschneria epilobium*
17) **Buckwheat**, *Eriogonum nudum*
18) **Shrubby penstemon,** *Keckiella* sp.
19) **California Buckwheat**, *Eriogonum fasciculatum*
20) **Deer grass,** *Muhlenbergia rigens*
21) **Pitcher sage**, *Lepechinia calycina*
22) **Our Lord's Candle,** *Yucca whipplei*
23) **Leather Oak**, *Quercus durata*
24) **Coyote-mint**, *Monardella villosa*
25) **Western Redbud,** *Cercis occidentalis*

What Is Serpentine?
Serpentine is a metamorphic rock that forms along fault lines under extreme pressure while under the earth's crust. Serpentine outcroppings can be recognized by their sparse vegetation and barren appearance. Serpentine rock has a distinctive waxy greenish-gray appearance. It often contains white streaks of minerals, also known as *asbestos*. Asbestos fibers are a known human health risk.

Soil Characteristics
Serpentine soils are unusually high in magnesium, as well as some heavy metals such as chromium, cobalt, iron, lead and nickel. These soils tend to be neutral to alkaline in pH. Many essential plant nutrients are unavailable or limited to plants, especially calcium, nitrogen, phosphorous, and potassium.

Serpentine-Hardy Plants are Unique
Plants growing in serpentine soils must tolerate drought, poor quality soils, exposure to heavy metals, and full sun. These conditions often result in the plants having a stunted or "bonsai" appearance. Plant growth is also limited due to the lack of vital nutrients. Plants that tolerate these stark conditions are predominately low-growing shrubs and a few varieties of trees. Their leaves are tough, silver or gray in color, and designed to reflect the hot afternoon sun. Some species have adapted to these harsh conditions so well they grow exclusively in serpentine.

What are the Health Concerns?
People may inhale or swallow dust containing asbestos fibers. The fibers can remain in the lungs or travel to the lining of the lungs and abdominal cavity and may cause cancer and other diseases. It may be twenty or more years before disease caused by asbestos develops. Smokers have an increased risk of lung cancer when exposed to asbestos.

Recommended Gardening Practices To Reduce Exposure

- Avoid areas where it is dusty or windy.
- If digging in dry soil, minimize dust by thoroughly watering the area.
- Remove shoes before entering the house.
- Wash clothing that may have been exposed to asbestos dust separately from other clothes.

Tips and Pointers for Planting

- To reduce natural erosion and dust, cover gardens and yards with serpentine-tolerant plants and a 3- to 6-inch layer of organic mulch or asbestos-free soil.
- Water plants often in the first few years or until plants are well established.

Living with Serpentine Soils
Serpentine soils are an important natural resource of Lake County. They support a wide range of unique and rare plant and animal life. Taking simple and common sense precautions will ensure that residents and soils can safely exist and flourish together.
Serpentine soils or rock should be left undisturbed and stabilized to reduce exposure or release of fibers to the environment. As long as fibers remain undisturbed in rock or soil, they pose very little health threat.

For more information on asbestos in soils and landscapes, contact or visit:

University of California Cooperative Extension
Asbestos Serpentine Soils Education Program
883 Lakeport Blvd. Lakeport, CA 95453
PH: 707/263-6838 Fax: 707/263-3963
E-mail: celake@ucdavis.edu
Web site: *http://celake.ucdavis.edu*

Plant Resources
Oracle Hill Nursery, Clearlake Oaks, California
Mendocino College Agriculture Department
Ukiah, California
North Coast Native Nursery, Petaluma
California Conservation Corp., Sacramento
Sparentine Nursery, Willits

Information compiled by
Julie Frazell, Program Representative;
Rachel Elkins, County Director/Farm Advisor;
Harrison Hoes, Master Gardener,
University of California Cooperative Extension,
Lake County, California.

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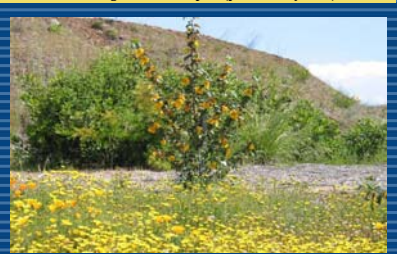
Lake County Air Quality Management District.

Acknowledgments
California Air Resources Board, California Geological Survey, Lake County Air Quality Management District, and University Of California McLaughlin Reserve

UC Master Gardeners Dave Vierra, Harry Hoes, and Gordon Story standing on the site of the serpentine garden demo project (planted May 2003)

LCAQMD/UCCE Master Gardener Serpentine Demonstration Garden-Ag Center, Lakeport (planted May 2003)



***Fremontia californica* (Flannel Bush) in bloom April 2005 Serpentine Demonstration Garden**

Peer Review: Bill Frost, UCCE County Director, El Dorado; Lorence Oki, CE Assistant Specialist Landscape Horticulture; Anthony "Toby" O'Geen, CE Soil Resource Specialist