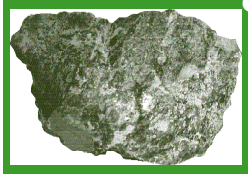


CALIFORNIA GEOLOGICAL SURVEY

# SERPENTINE CALIFORNIA STATE ROCK

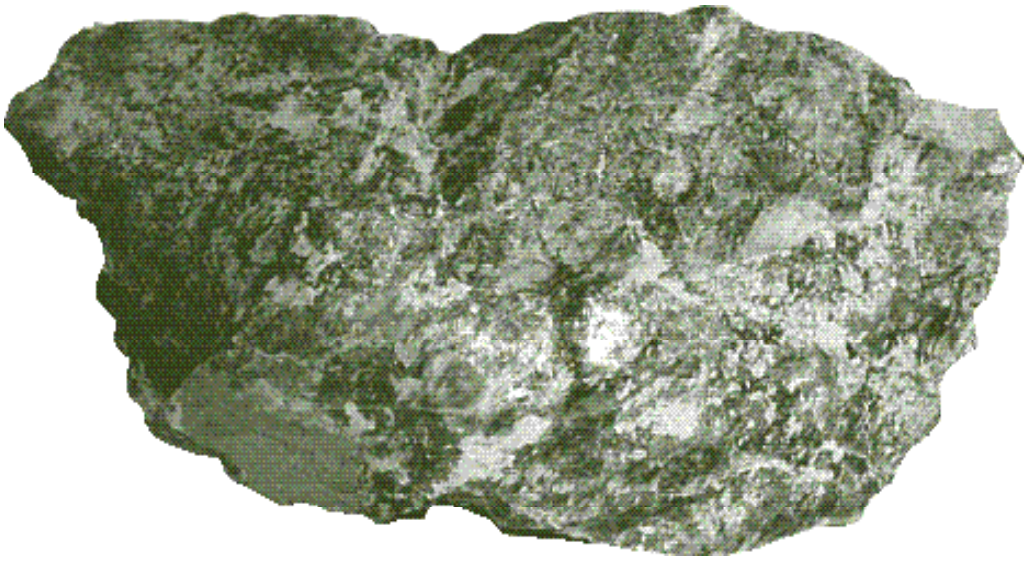
NOTE 14

Serpentine rock is apple-green to black and is often mottled with light and dark colored areas. It has a shiny or wax-like appearance and slightly soapy feel. Serpentine is usually fine-grained and compact but may be granular, platy or fibrous. It's found in central and northern California—in the Coast Ranges, Klamath Mountains and Sierra Nevada foothills.

Serpentine rock is primarily composed of one or more of the three magnesium silicate minerals: lizardite, chrysotile and antigorite. Chrysotile often occurs as fibrous veinlets in serpentine. Chrysotile in fibrous form is the most common type of asbestos. Asbestos is a group of silicate minerals that readily separates into thin, strong and flexible fibers that are heat resistant. Lizardite and antigorite don't form asbestos fibers and instead are plate-like.

Serpentine is metamorphic and/or magnesium-rich igneous rock, most commonly peridotite, from the earth's mantle. (The mantle is a thick layer of rock just below the earth's crust.) Peridotite underlying oceanic crustal rocks was metamorphosed to serpentine in subduction zones that existed at various times in California's past. (A subduction zone is where ocean crust rocks run into and slide underneath the edge of a continent.) Because serpentine has a much lower density than peridotite, it rose toward the surface along major regional thrust faults associated with the subduction zones.

Serpentine is the same rock type as serpentinite.



Serpentine often contains some asbestos. Exposure to asbestos fibers has potential human-health consequences. Therefore, the Air Resources Board restricts its use as unpaved road surface material.

For information on serpentine use in California, call the Air Resources Board at 800-363-7664 or your local Air Pollution Control District Office.

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## SERPENTINE FACTS

**Composition**: $Mg_6Si_4O_{10}(OH)_8$

**Crystal system**: Monoclinic (antigorite has a hexagonal polymorph, chrysotile two orthorhombic polymorphs).

**Habit**: Crystals unknown: the serpentine minerals usually occur in structureless masses, except when asbestiform.

**Cleavage**: None observable

**Hardness**: 4-6

**Density**: 2.5-2.6

**Color**: Usually green, also yellow, brown, reddish brown and gray.

**Streak**: White

**Luster**: Waxy or greasy in massive varieties, silky in fibrous material.

**Occurrence**: Serpentine is formed by the alteration of olivine and enstatite under conditions of low-and medium-grade metamorphism. It sometimes occurs as large rock masses. Massive serpentine is sometimes cut and polished as an ornamental stone.

*Graphics by Dinah D. Maldonado, California Geological Survey.*

**Offices of the California Geological Survey**

**Publications and Information Office**
801 K Street, MS 14-33
Sacramento, CA 95814-3532
(916) 445-5716

**Southern California Regional Office**
655 South Hope Street, Suite 700
Los Angeles, CA 90017-3231
(213) 239-0878

**Bay Area Regional Office**
185 Berry Street, Suite 210
San Francisco, CA 94107-1728
(415) 904-7707

www.conservation.ca.gov

THE RESOURCES AGENCY
MARY NICHOLS
SECRETARY FOR RESOURCES

STATE OF CALIFORNIA
GRAY DAVIS
GOVERNOR

DEPARTMENT OF CONSERVATION
DARRYL YOUNG
DIRECTOR