

Department of Conservation
California Geological Survey
Mineral Resources and Mineral
Hazards Mapping Program



NATURALLY OCCURRING ASBESTOS IN CALIFORNIA

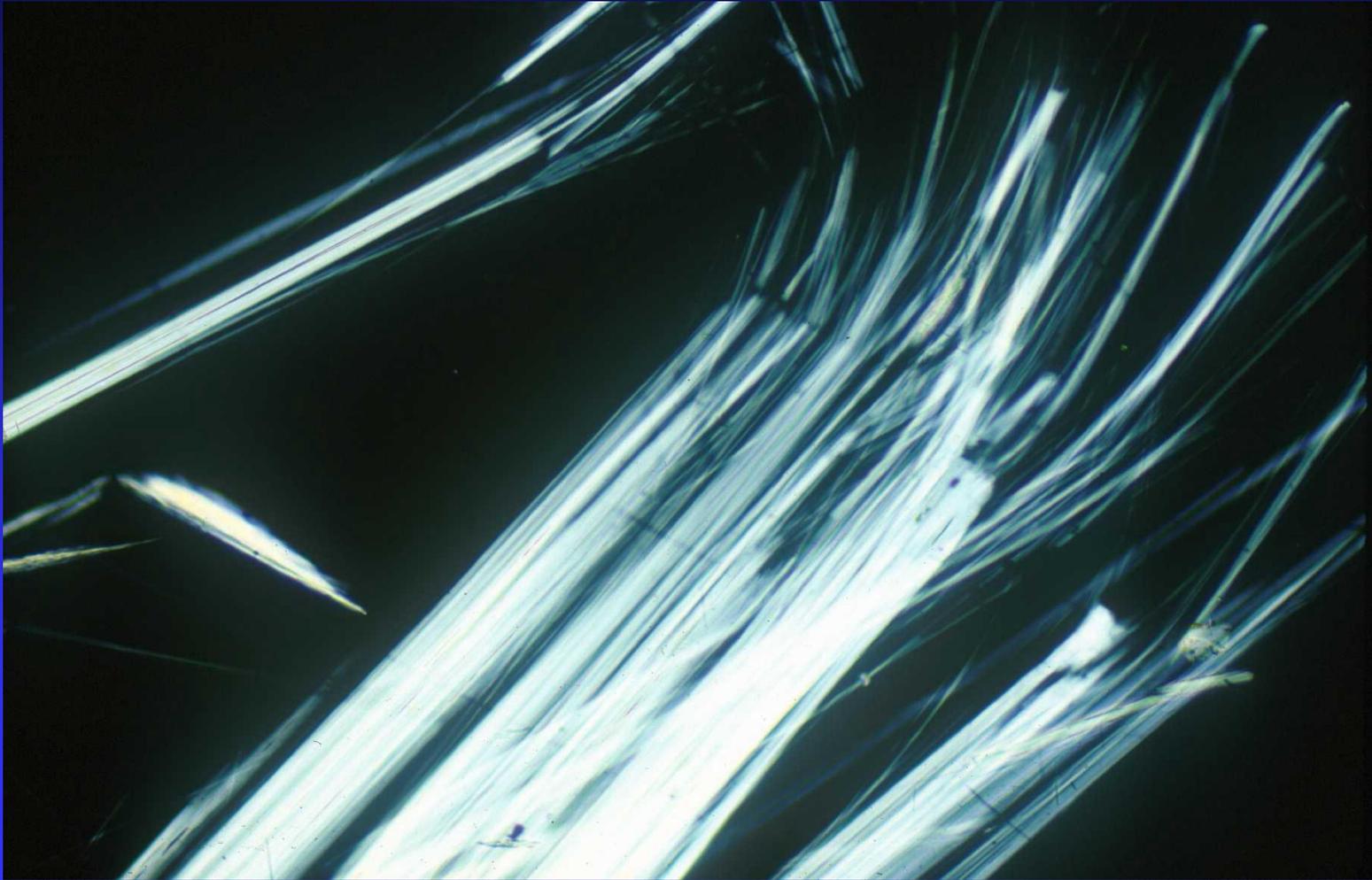
The background image shows a close-up of a rock surface with a distinct fibrous texture, characteristic of asbestos. The rock is light-colored and appears to be part of a larger outcrop. A small, dark, circular scale marker is visible on the rock surface, with the word "CANTON" printed on it. The surrounding area is covered with dry, brown pine needles and twigs, suggesting a natural, outdoor setting.

- Background
- NOA in California
- Maps

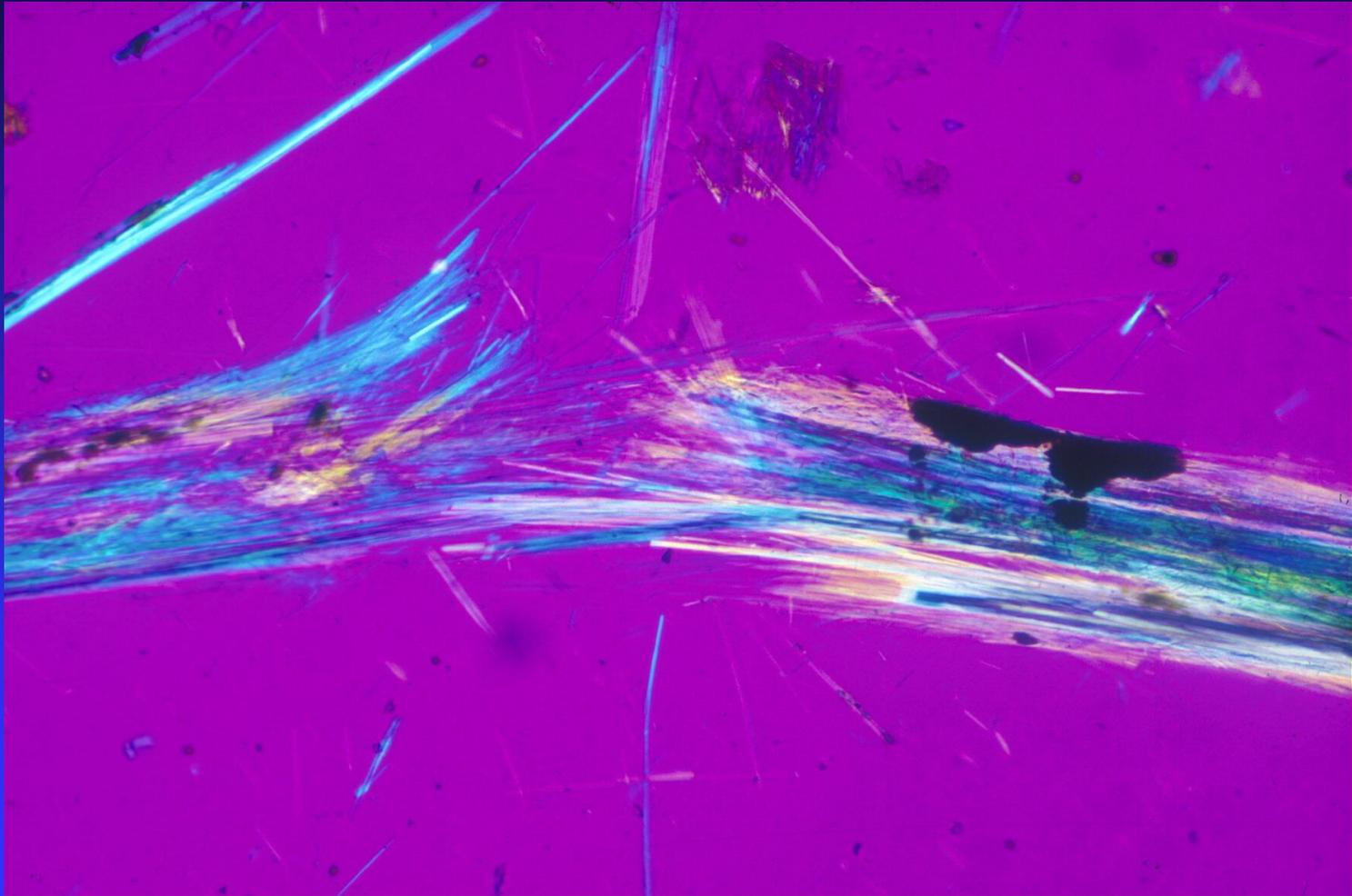
What Is Asbestos?

- Asbestos is a term used to identify the fibrous or asbestiform habits of six minerals.
- The six types of asbestos are:
 - ◆ Chrysotile (serpentine asbestos).
 - ◆ Crocidolite, Amosite, Tremolite, Actinolite, and Anthophyllite (amphibole asbestos).

Chrysotile (~35X)



Tremolite (~35X)



Health Effects (Inhalation)

- Asbestosis - a diffuse fibrous scarring of the lungs.
- Lung cancer - a malignant tumor in the lungs.
- Pleural plaques - localized fibrous scars lining the space around the lungs.
- Mesothelioma - a rare malignant cancer of the membranes lining the lungs, chest, and abdominal cavity.

Regulations Exist To:

- Limit worker exposure to asbestos;
- Minimize emissions of asbestos from industrial, construction, and waste handling activities;
- Control asbestos containing materials in schools and buildings;
- Limit the level of asbestos in water; and
- Restrict or prohibit the use of asbestos in certain products and applications.

What Is Naturally Occurring Asbestos (NOA)?

Naturally occurring asbestos (NOA) is the term applied to the natural geologic occurrence of any of the six types of asbestos.

How Does NOA Occur In The Field?

- NOA may be found:
 - ◆ In veins
 - ◆ On slip surfaces in rocks and between rock units
 - ◆ As mass fiber
 - ◆ As loose fibers or fiber bundles in soil and sediment

Cross Fiber Asbestos



Cross Fiber Asbestos



Slip Fiber Asbestos



Slip Fiber Asbestos



Mass Fiber Asbestos



Mass Fiber Asbestos



Why Is NOA A Concern To CalTrans ?

- Worker Safety / Public Safety
- Regulatory Compliance
- Hazmat Issues
- Public Relations

Public Relations

Sacramento Bee 8/14/01

★★ B3

Asbestos found at site of Auburn multiplex

By Art Campos
BEE STAFF WRITER

Testing of soil from a construction site for a 10-screen multiplex in Auburn has confirmed the presence of naturally occurring asbestos.

Grading work on the Nevada Street site by Cinecon Group Inc. was voluntarily halted last week after Placer County health officials discovered serpentine rock, which often yields the cancer-causing fibers.

Cinecon officials have ordered the area to be kept wet to reduce dust being blown into the air. They also have submitted a mitigation plan describing other measures being taken to eliminate risk to their workers and to the community.

Dr. Richard Burton, county public health officer, said Cinecon is complying with all requirements.

"Typically, they would submit this plan now and a more comprehensive plan later to describe how they will complete the construction while they continue to mitigate any health risks," Burton said.

In the meantime, there is no increased risk to the community, he said, and Cinecon, which specializes in the building of movie theaters, has been authorized to con-

tinue doing trenching work.

"But anything beyond trenching would require them to submit the more comprehensive site assessment and mitigation plan," Burton said.

Such a plan would identify the extent of asbestos on the site and would address the remainder of work to be done, he said.

Officials for the Chico-based Cinecon could not be reached for comment.

Last week, Rick Huffman, president of Cinecon, said his company intended to deal with the situation quickly.

Nevada Street remains open to traffic, but the construction site, just north of Palm Avenue, is closed to the general public.

The proposed 10-screen project is within the city limits of Auburn and was approved by the city. An Auburn official said last week that Cinecon's geotechnical reports did not show the presence of the serpentine rock.

Grading work began earlier this month, but a complaint of excessive dust prompted county officials to investigate.

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The Bee's Art Campos can be reached at (916) 773-2825 or acampos@sacbee.com.

Project's asbestos stirs up concerns

An El Dorado Hills school construction site yields fibers.

By Chris Bowman
BEE STAFF WRITER

Construction crews at an El Dorado Hills high school carved into rock rich with asbestos of the most hazardous kind and created athletic fields with contaminated soil while school was in session last month.

Tests commissioned by The Bee found asbestos fibers in dust on the campus parking lot, on the fields under construction and in veins of rock exposed from excavation.

NATURALLY OCCURRING ASBESTOS IN CALIFORNIA

- Background
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NOA In California

- Chrysotile is the most common type of asbestos.
- Chrysotile is primarily associated with serpentinite or serpentinitized ultramafic rock.
- Tremolite is probably the most common type of amphibole asbestos.

NOA In California

- Amphibole asbestos may occur in and adjacent to serpentinite and ultramafic rock and in other geologic settings such as:
 - ◆ Contact metamorphosed carbonate rocks (limestones or dolomites).
 - ◆ Other metamorphic rocks.
 - ◆ Sedimentary rocks or in soils derived from asbestos-containing parent materials.

Ultramafic Rocks / Serpentinite



Ultramafic Rocks / Serpentinite



Ultramafic Rocks / Serpentinite



Ultramafic Rocks / Serpentinite



Ultramafic Rocks / Serpentinite



Weathered Serpentinite



Ultramafic Rocks / Serpentinite



Geologic Contacts

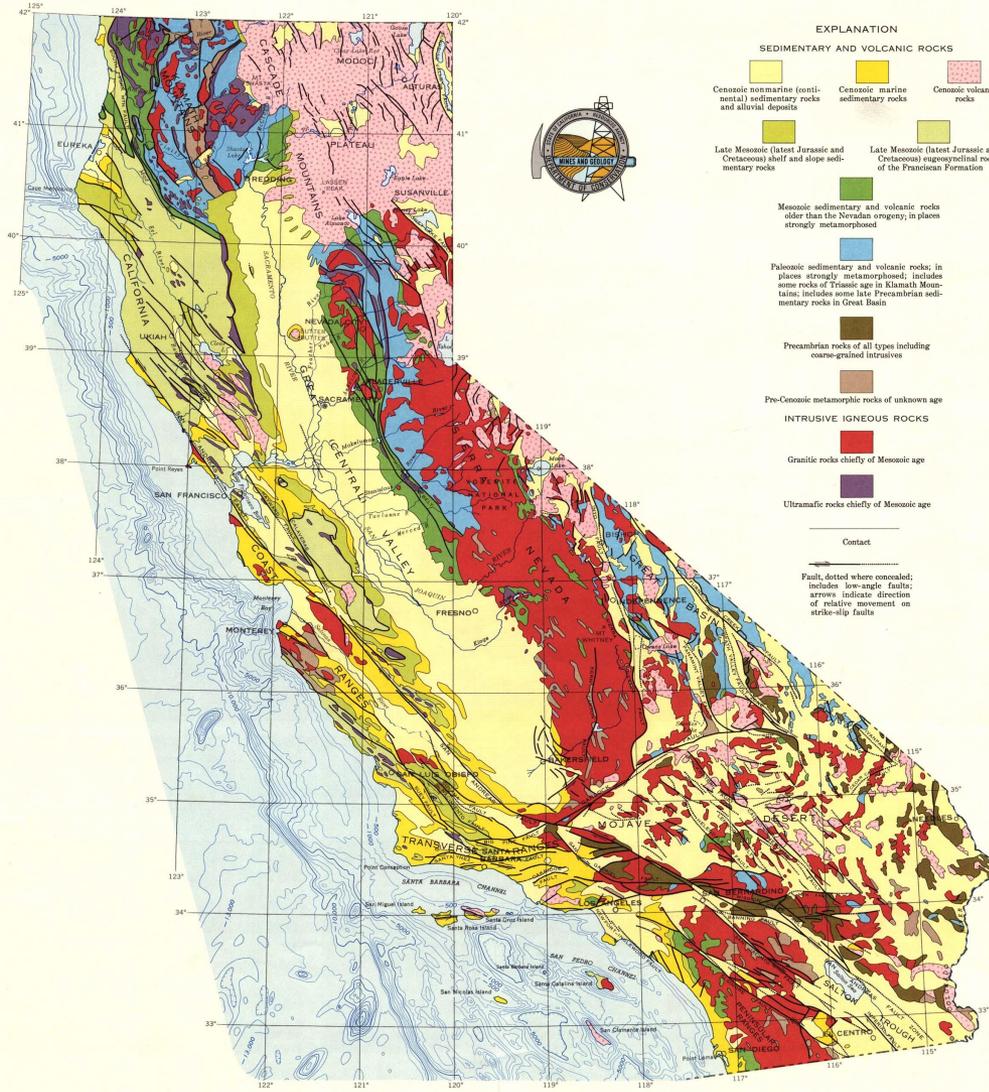


Dikes or Inclusions



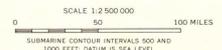
Where Is NOA Found In California?

- In serpentinites and serpentinitized ultramafic rocks, which are common in the foothills region of the Sierra Nevada, the Coast Ranges, and northwestern California.
- Tremolite asbestos has been found in most of the counties in the Sierra Nevada and the Klamath Mountains.
- NOA may occur more frequently in fault or shear zones.

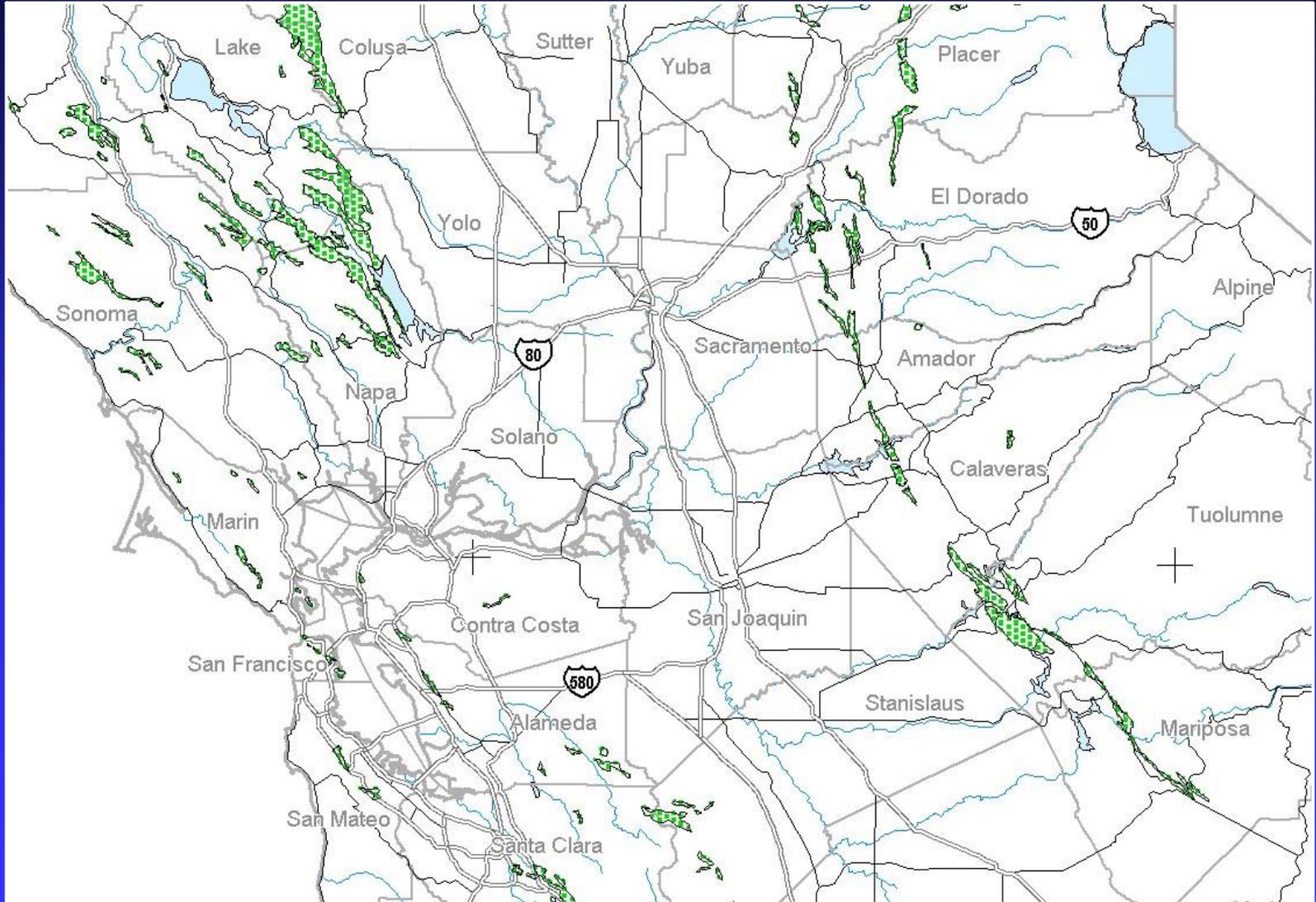


GEOLOGIC MAP OF CALIFORNIA

COMPILED BY U.S. GEOLOGICAL SURVEY
AND CALIFORNIA DIVISION OF MINES AND GEOLOGY



Ultramafic Rock Map Close-up



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What Do Geologic Maps Show?

- The distribution, nature, and age relationships of rock units.
- Structural features (faults, folds).
- Sometimes show distribution of surficial deposits.

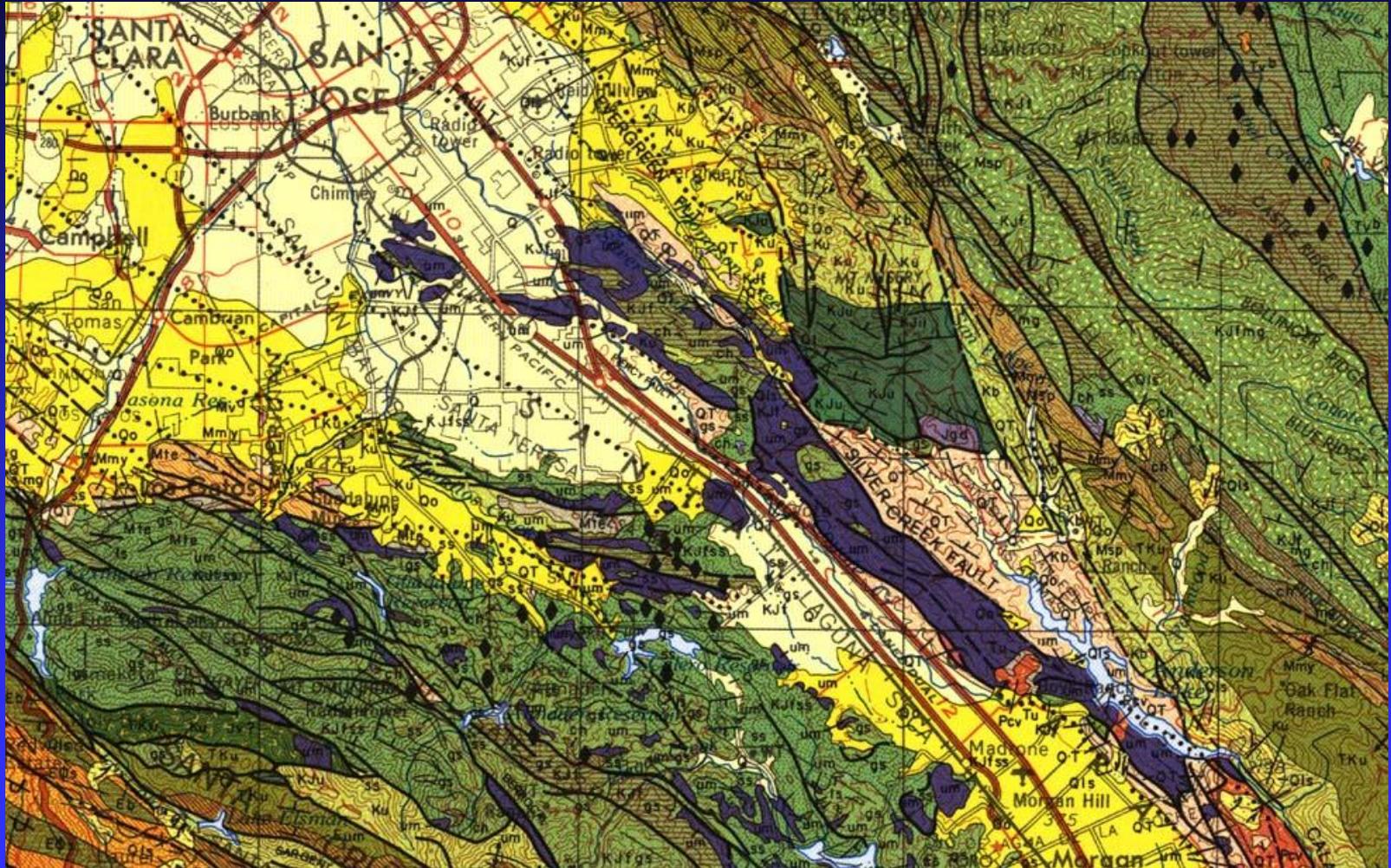
What Do Geologic Maps Tell You About NOA?

- Geologic maps may help identify areas with a higher or lower likelihood of containing NOA.
- Geographic Ultramafic Rock Units (regulations).

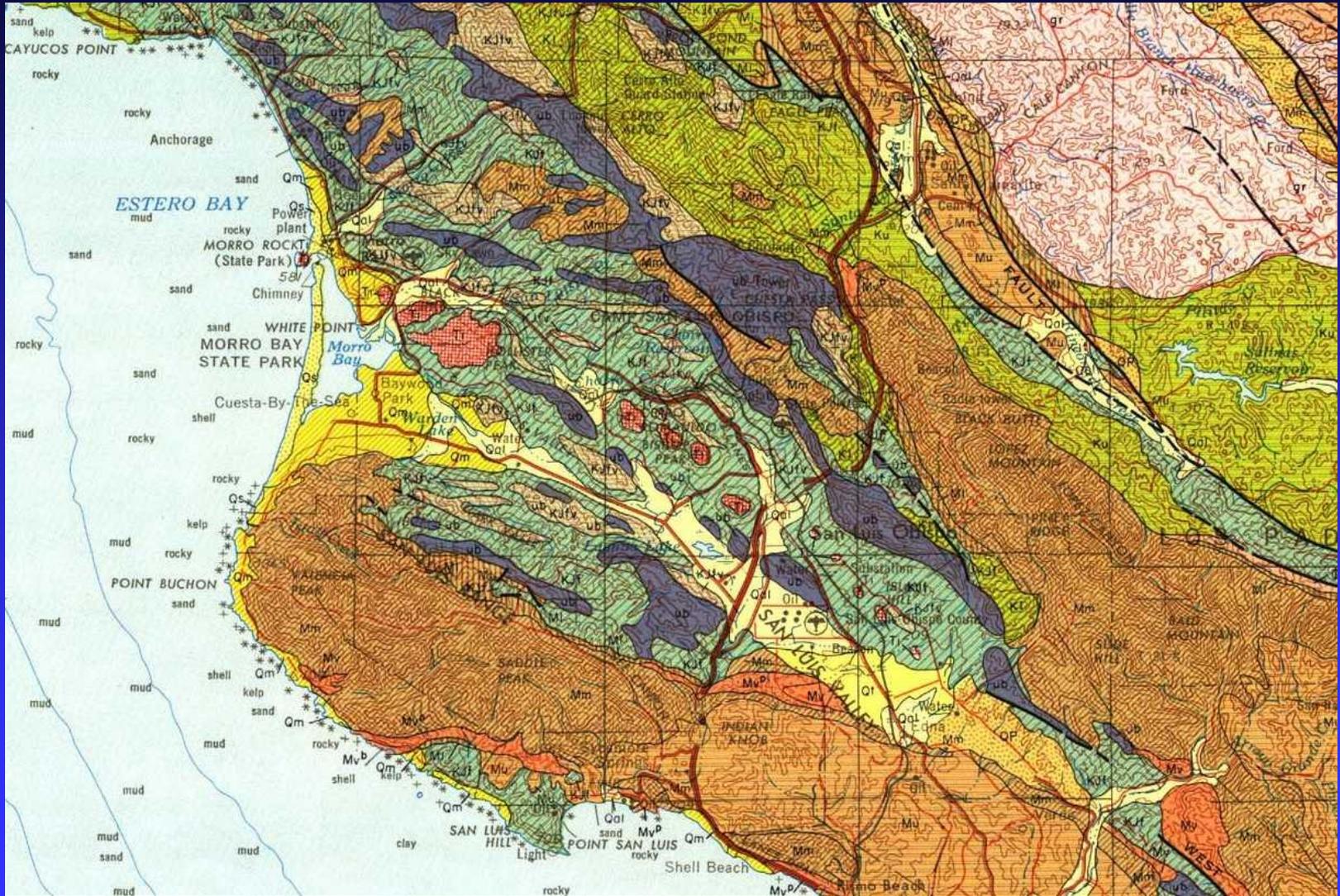
What Geologic Maps Don't Tell You About NOA?

- If NOA is present at a particular location.
- If NOA is absent at a particular location.

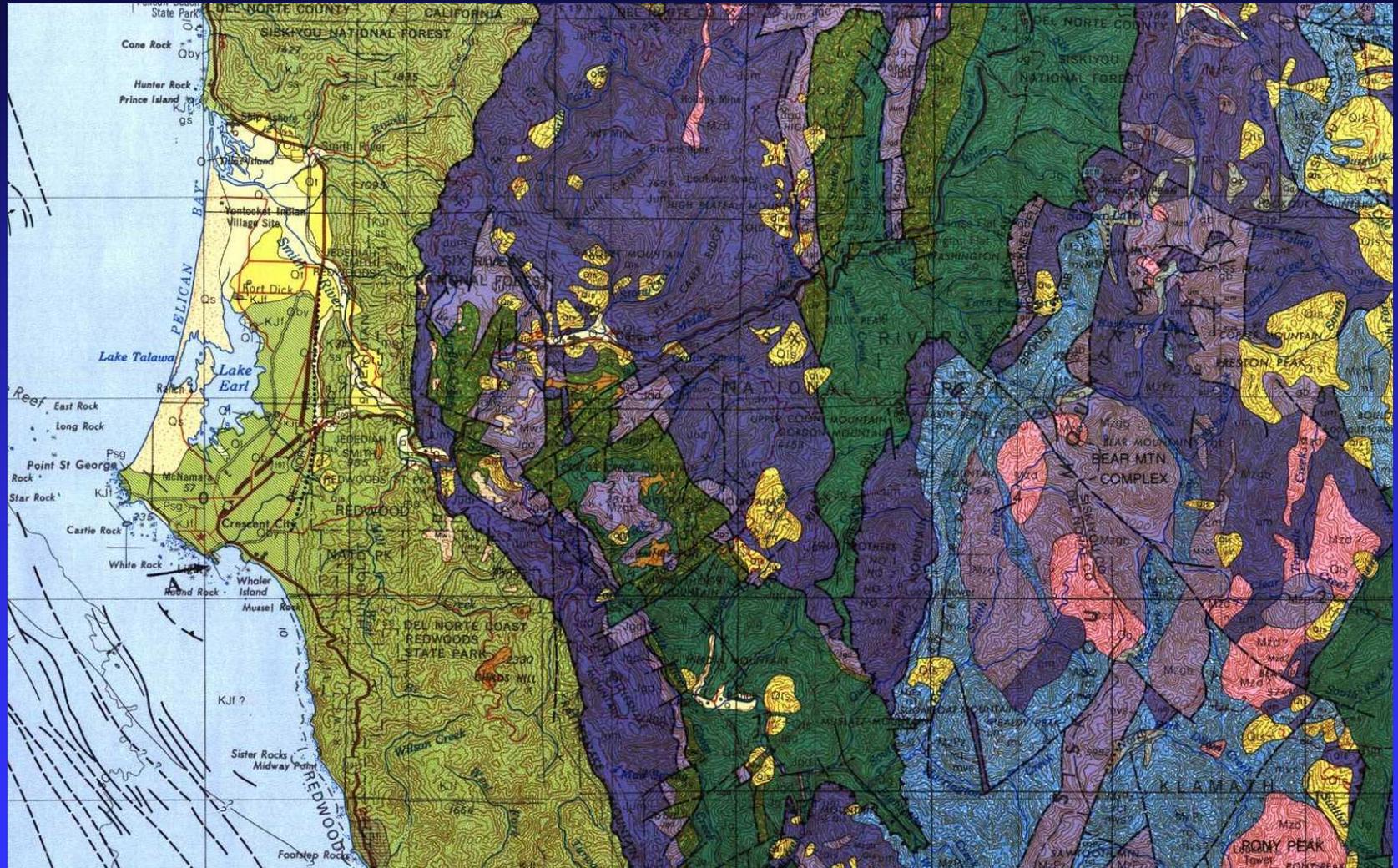
San Jose Area



San Luis Obispo Area



Crescent City Area



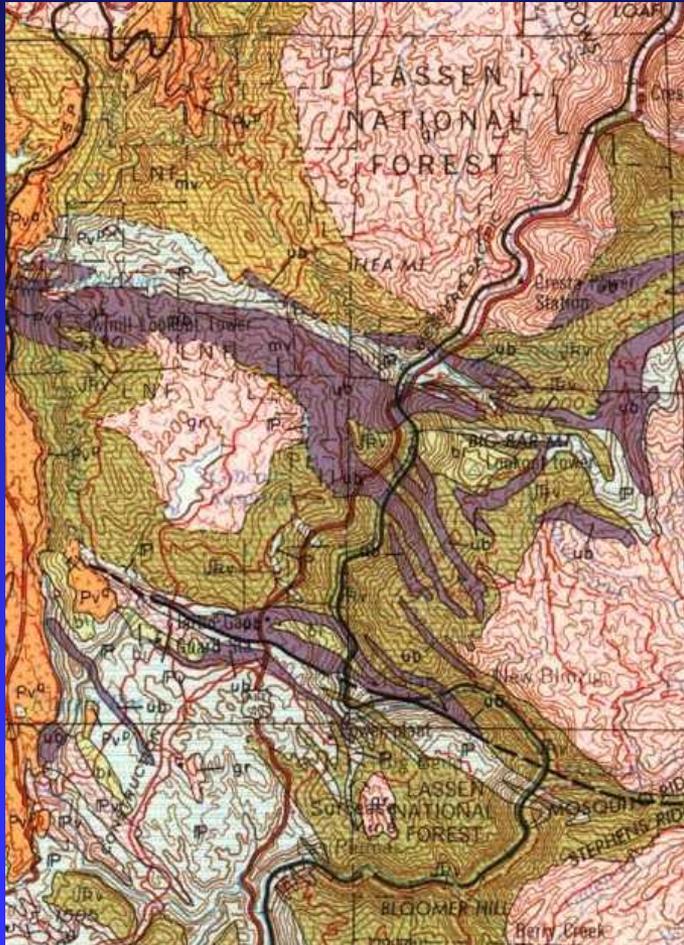
Using Geologic Maps

- Be aware of the date or version of the map. More recent maps are usually preferred.
- Use the largest scale (most detailed) maps appropriate for the project.
- Read the map legend to identify which patterns or colors indicate ultramafic or ultrabasic rock units.

Chico Sheet

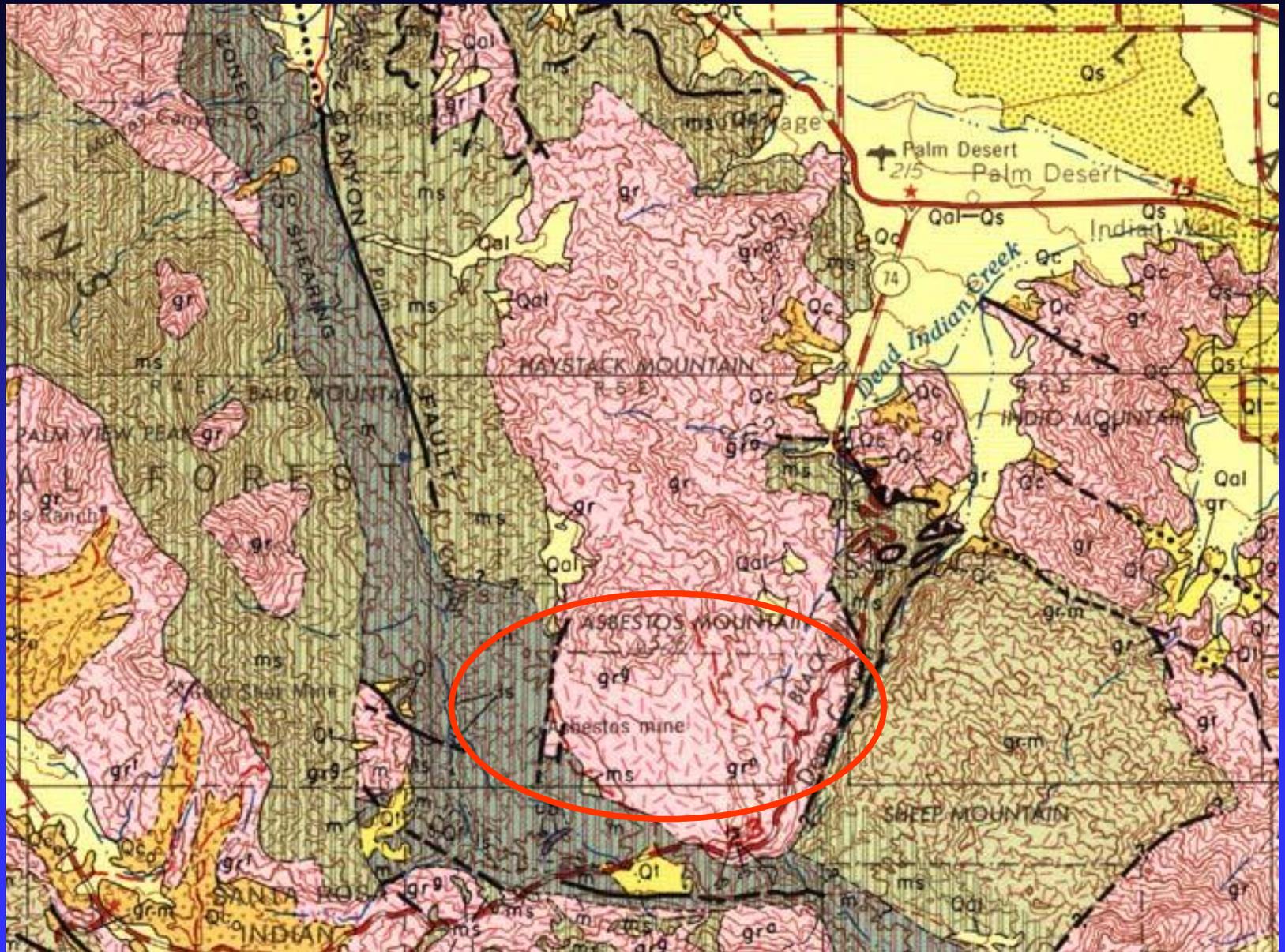
1962

1992



Map Scales

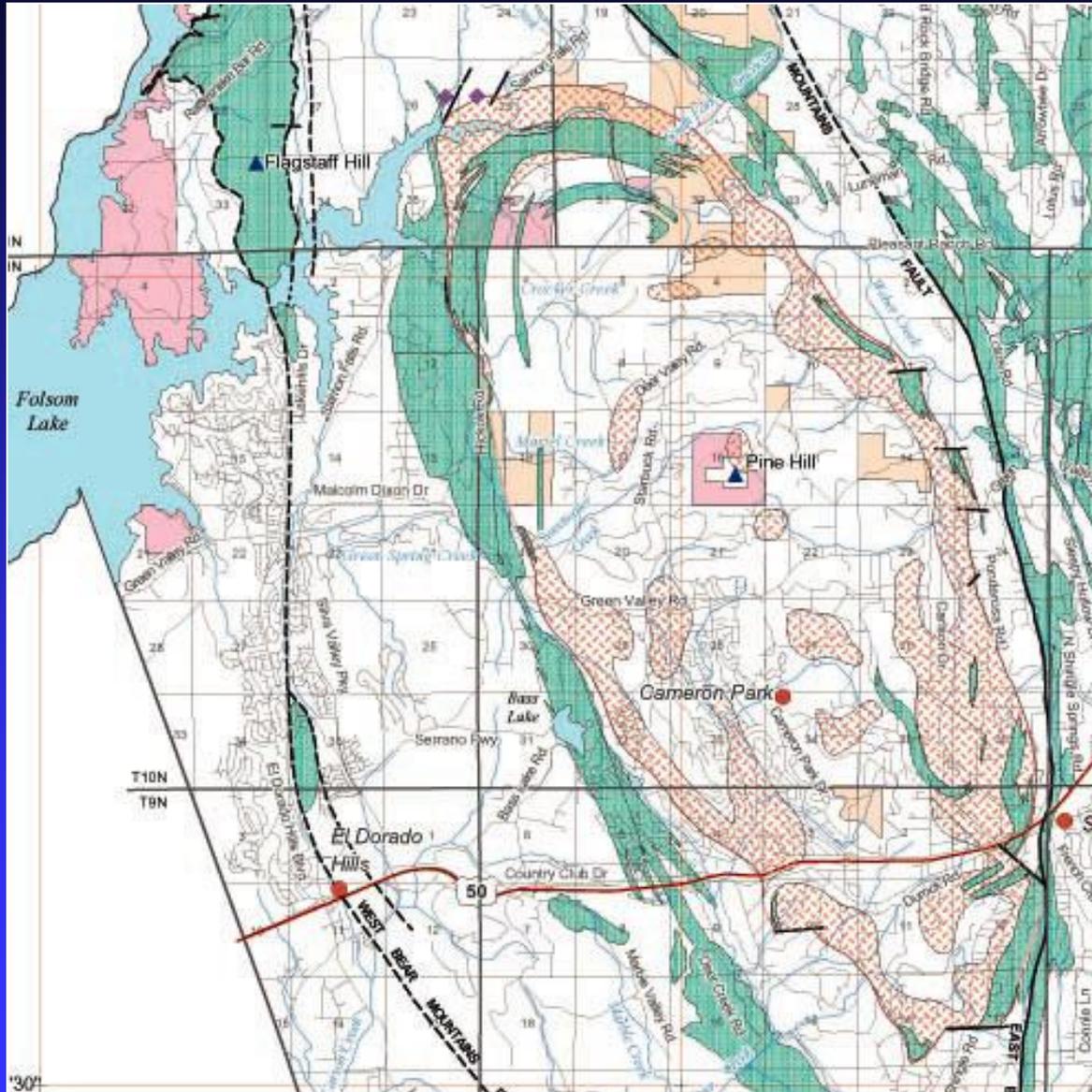
Map Scale	1 Inch	1/20 Inch	1/20 Inch²
1:1,100,000	17.4 miles	4,583 feet	480 acres
1:250,000	4 miles	1,042 feet	25 acres
1:100,000	1.6 miles	417 feet	4 acres
1:24,000	2,000 feet	100 feet	0.23 acres
1:240	20 feet	1 foot	1 sq. foot



What Is A NOA Map And What Does It Show?

- Compilation of more detailed geologic maps, soils maps, and other geologic information related to NOA.
- Areas likely to contain NOA are identified rather than geologic units.
- Intended for use by non-geologists.

NOA Map (detail)



CGS / Caltrans Agreement

- CGS will assist Caltrans by:
 - ◆ Providing maps of geographic ultramafic rock units to the Caltrans districts.
 - ◆ Providing an index to geologic maps and soils reports for the districts.
 - ◆ Providing reports summarizing the potential for NOA in the districts.
 - ◆ Assist in training Caltrans staff
 - ◆ Other (e.g. detailed NOA maps)