



WELCOME TO THE USGS

The U.S. Geological Survey (USGS), established by an act of Congress in 1879, is the Nation's largest natural science and civilian mapping agency. The USGS works in cooperation with more than 2,000 organizations across the country to provide reliable, impartial scientific information. This information is used to minimize the loss of life and property from natural disasters, safeguard the Nation's natural resources, and enhance quality of life through careful monitoring of water, biological, energy, and mineral resources.

The USGS Headquarters and Eastern Region Center are located together in Reston, Virginia and the Central Region Center is in Denver, Colorado.

The Western Region Center, located in Menlo Park since 1954, administers offices throughout nine western states and the Pacific Trust Territories. This nine-state and Pacific Trust region has 2,500 USGS employees, with about 800 in Menlo Park.

Natural and Historical Setting

The Menlo Park offices of the U.S. Geological Survey are sited in the San Francisco Bay region, an area of complex and exciting geology. The region occupies the boundary zone between two of the major tectonic plates that make up the outer shell of the Earth—the Pacific Plate and the North American Plate. The many active faults slicing through the region, the frequent earthquakes, and the very young ranges of hills and mountains that have been pushed up in the region are results of the relentless motion of these plates.

San Francisco Bay occupies a depression formed long ago when a block of the Earth's crust subsided between two of the region's major faults. The rise of sea level at the end of the Pleistocene Epoch of Earth history (about 10,000 years ago) flooded this depression to form the Bay, an inlet of the Pacific Ocean.

The USGS campus was built atop sedimentary deposits—mostly sands, gravels, and silts—laid down during the past few thousand years on the margins of the bay by San Francisquito Creek and other streams carrying debris down from the nearby hills. These deposits continue to form today, and new layers are added to the land whenever the streams flood.

This area, like much of the lands around San Francisco Bay, was once home to the Ohlone people. The Spanish first explored the area in the late 1700s and established several large rancheros in the area. Settlers discovered the mild and sunny climate of the area in the 1850s, and soon many wealthy families from San Francisco acquired Menlo Park properties to serve as their summer homes. The present site of the USGS was once part of the estate of Mark Hopkins, of California railroad and hotel fame. During World War II, the site was part of the Dibble Army Hospital, the receiving area for wounded returning from the Pacific front. After the hospital was decommissioned in 1947, part of the site was designated by Congress for use by the USGS.

Your Tour

This self-guided tour introduces you to the Western Region Center and the scientific research conducted here. The tour is most appropriate for a group of 6 or less and for students age 10 and older. Guided tours for larger groups may be arranged by calling the Office of External Affairs at 650-329-4000. Every stop on this tour is wheelchair accessible, either by elevator or by ramp. For any other special needs, please call the number above.

Beginning and ending in Building 3 (see map in center of booklet), your tour should take approximately one hour. Exhibits are located in the halls and lobbies of Buildings 1 and 3 and are available for viewing weekdays (except national holidays) between 8 a.m. and 4 p.m.

Please do not enter buildings that are not designated as part of the tour; these offices and laboratories do not contain exhibits.

Picnic tables are available for your use, and sandwiches, snacks, and drinks may be purchased in the snack bar located at the south end of Building 20.

Restrooms, including those with wheelchair accessibility, are available and well marked in the buildings designated for the tour.

The tour includes 14 stops, which are shown on the map. Directional signs are posted along the tour route. Many of the trees, shrubs, and rock specimens along your walk and elsewhere on the grounds are labeled. Icons in this booklet provide a generalized identification key to features on this tour:



Building tours



Trees and shrubs



Rocks and minerals

Stop 1

 As you enter the main lobby of Building 3, our **Visitor Center** is on your right. The center is the ideal place to get acquainted with the world of natural science. The Visitor Center has permanent displays exploring the interrelations among the land, water, air, and life. Enjoy the various displays on earthquakes, volcanoes, ecosystems, water resources, and mapping that highlight current USGS research. Here you can get a general introduction to the nature, history, and mission of the USGS.

 The hallways in Building 3 serve as a gallery for numerous USGS maps, publications, and posters on current research. A century-old plaster raised-relief map of California is mounted on the back of the lobby pillar. It was originally hand-crafted by a USGS cartographer, George Richards, in 1892 and was restored by the Bureau of Land Management (BLM) in 1945. During the restoration, additional information on the Sacramento Valley was added to the map. Note the prices of houses and land listed in the bottom left corner!

Stop 2

 Continue down the central hallway to the **Earth Science Information Center (ESIC)**. The ESIC offers an opportunity to browse through topographic and geologic maps, books, and other USGS publications and to purchase items of interest. In addition to these items, assistance is available for locating and (or) ordering products such as aerial photographs, historical maps, or digital data. **If you have only a limited time to visit the USGS, this should be your one stop!**

 As you enter the ESIC, notice the display cases containing traditional surveying instruments from the 19th and 20th centuries. Because of the advent of computers, satellites, and radar, these instruments are no longer used by the USGS to establish “control points” needed to determine elevations and distances for map making. Instruments like these, however, played a large role in mapping unknown territory during the settlement of North America, from the time of the earliest surveyors, such as George Washington, into the second half of the 20th century.



Next to the ESIC entrance you will see a large, colorful painting. This painting was done by a USGS fieldman, Hal Shelton, in 1940. The painting depicts mapping techniques used in the early days of cartography, including an alidade and stadia rod for determining distances and elevation and a plane-table for sketching contour lines. Note the “U.S.” marking on the canteen; many of the field supplies were from Army surplus.



Adjacent to this painting are shelves containing numerous brochures on subjects from fossils to map reading. These publications are free, but please take only what you need. If you are planning a full tour of the USGS campus, you may want to make the ESIC your final stop, so that you won't have to carry the materials and purchases as you tour.



Leaving the ESIC office, return to the California raised-relief map on the lobby pillar, turn left, and follow the long hallway. As you exit Building 3, under the stairwell on your left is a large specimen of **gold ore** from the McLaughlin Mine situated at the junction of Napa, Sonoma, and Lake Counties. The siliceous sinter (a hot-water deposition of layers of silica) contains minute bits of gold and mercury. Historically a mercury mine during the California gold rush, the McLaughlin Mine was reopened in the 1980s to mine gold, but is now closed once more.

Stop 3



Continue walking to the outdoor plaza between Buildings 3 and 15. The graceful trees that shade this courtyard are **Jacarandas** (*Jacaranda mimosifolia*), native to the tropics and found more often in southern California. If you are visiting in June or early July, you will have the pleasure of seeing their beautiful lavender blossoms. **Star jasmine** (*Trachelospermum jasminoides*) grows under these trees.



Turn left and proceed to the large black columns in the center of the plaza. The four large polished columns located on the upper plaza near the water wall are an artist's conception of California, broken by faults. The black rock that makes up these columns is from the Academy Quarry in the western Sierra Nevada, east of Fresno. The rock, which is approximately 120 million years old, is a **quartz diorite** containing the dark-colored minerals hypersthene, hornblende, and biotite.



To the right of the columns is a **quartz diorite water wall** and artificial stream. These are part of the Art-in-Architecture program that was established in 1963 by the President's Ad Hoc Committee on Federal Office Space. To date, more than 200 works of art have been installed through the program, which seeks to incorporate fine art in the designs of Federal buildings, with emphasis on the work of living artists. While the purpose of the moving water is aesthetic, it also serves as an educational tool when USGS hydrologists use the long trough and

whirlpool to demonstrate water-measurement methods to visiting students. Follow the stairs down to the lower courtyard to view the beautiful waterfall. If you cannot manage the steps, there is a ramp at the far end of the plaza.

Stop 4



Behind you in the glass window display area notice the **pillow lava**. Pillow lava is produced when hot-fluid basaltic lava is cooled under water. These relatively young and fresh pillows were dredged from depths of about 7,000 feet during several cruises to the Juan de Fuca Ridge, 300 miles west of the Washington State coast. Retrace your steps to the plaza, turn left, and proceed to the corner of the large building on your left.

Stop 5



The building before you is the Vincent E. McKelvey Federal Building, which houses one of the USGS libraries and many water resources researchers. This building (15) was dedicated in 1996 and is named for former USGS director (1971-1978) Vincent McKelvey, who did much of his early field work in the Sierra Nevada.



At the top of the corner stairs is the **library** (a ramp is located to your left). This library is one of the many USGS research libraries specializing in the natural sciences. The largest regional libraries are located in Reston, Virginia; Denver, Colorado; Flagstaff, Arizona; and Menlo Park, California. Together they contain the most extensive collection of natural science materials in the world. The library is open to the public for reference use. Materials may be borrowed on interlibrary loan by requesting items through a local participating library.



Inside the library you will find a large display case devoted to the career of Vincent McKelvey. Two other display cases contain changing exhibits. Other areas of interest are the California Center, which is a collection of books, maps, and journals on California geology, water, ecology, soils, mining exploration, and history; an aerial photography collection; and a display case of common rocks and minerals of the San Francisco Bay Area. The library also has an extensive educational resource room for teachers.

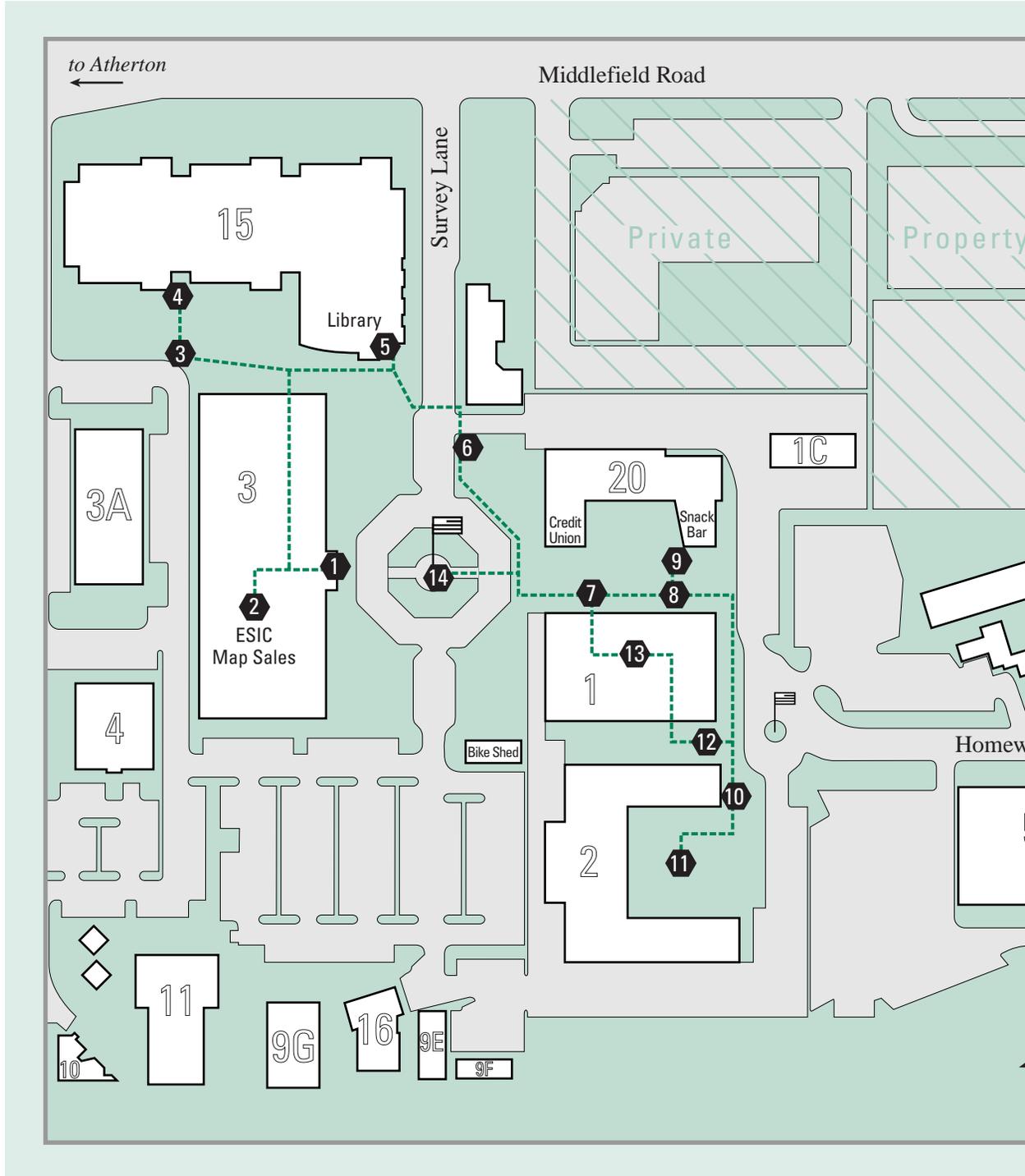


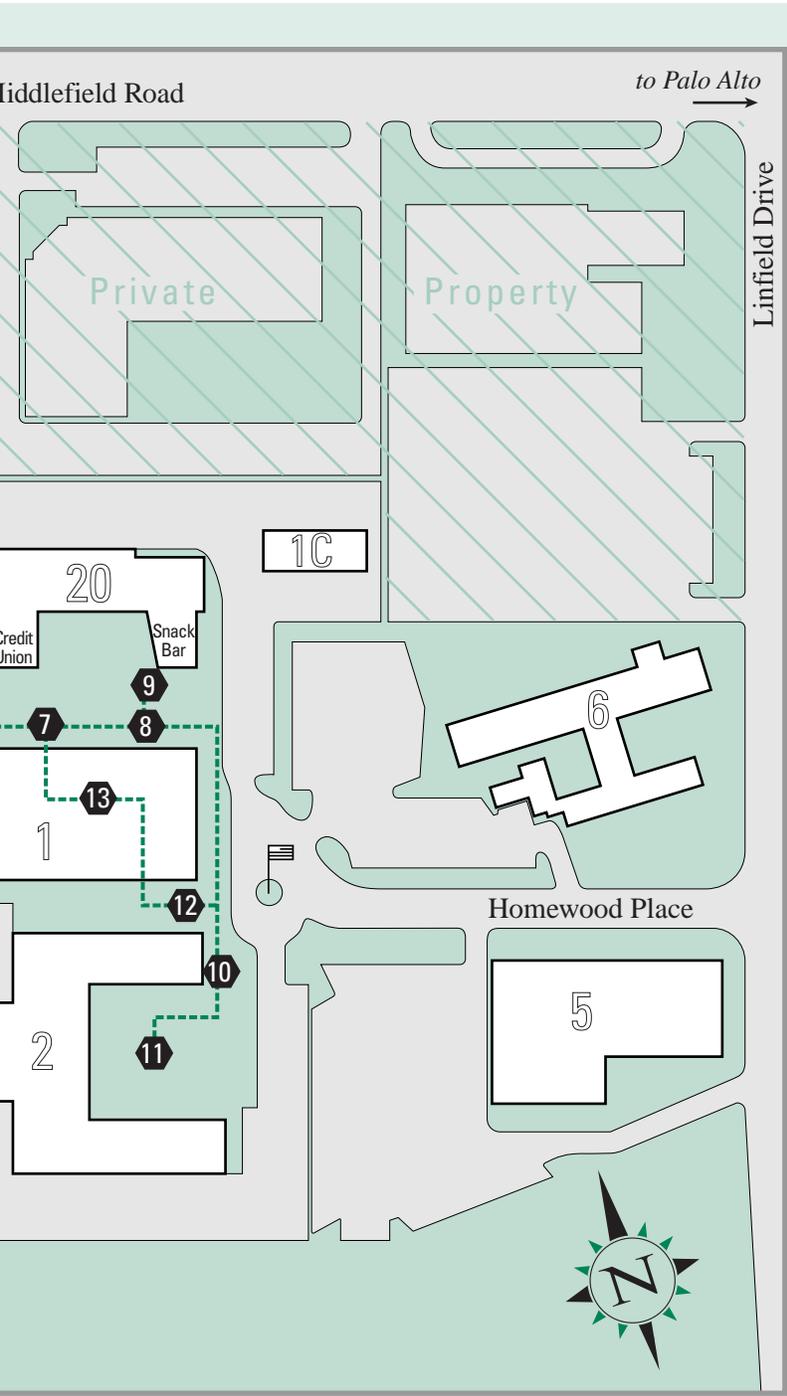
As you tour the library you will notice globes and other depictions of the Earth in numerous formats. These globes have been collected by a USGS cartographer, Tau Rho Alpha, who has donated them to the library for display.

Stop 6



After leaving the library, cross the street to the two large **coast redwood trees** (*Sequoia sempervirens*). Beneath the trees is a bronze plaque on a





U.S. Geological Survey Western Region Center Menlo Park, California

Campus map legend

Self-guided tour route and numbered stops

Look for these signs along the tour route to help guide you along your way:

Numbered signs indicate tour stops.

Directional signs indicate tour route.

redwood base honoring the memory of William Pecora, USGS Director from 1965 to 1971.

 As you continue walking toward Building 1, you will pass Building 20 on your left. This is the USGS services building and is home to the mail room, the Menlo Survey Federal Credit Union, and at the far end a snack bar, which is open from 7 a.m. to 4 p.m., Monday through Friday.

Stop 7

 By the entrance to Building 1, you will notice a **petrified log**. This specimen, which was collected in Nevada, preserves the features of a tree from the Miocene Epoch of geologic time (from about 24 to 5 million years ago). The natural wood has been fossilized through replacement with silica (quartz).

Stop 8

 Continue along the azalea-lined sidewalk parallel to Building 1 until you reach the second door and turn left, toward the snack bar. Here, in a flower bed adjacent to the sidewalk, is a rounded granitic boulder that may look like any number of weather-worn granites from the Sierra Nevada or Rocky Mountains. This rock, however, is a long way from its origins. USGS scientists brought it back from **Antarctica** in 1984. It comes from the eastern flank of Iselin Bank, a large undersea ridge that extends nearly 200 km from the Ross Sea into the South Pacific Ocean. With the exception of the Antarctic rock that was used for Admiral Byrd's headstone, this is the largest piece of Antarctica to have been shipped from that continent.

Stop 9

 Now that you've seen and touched a piece of Antarctica, go a few steps farther toward Building 20 to view another unusual rock. This piece of **Mount St. Helens lava**, is dedicated to the memory of David Johnston, the USGS scientist who died in the catastrophic explosion of the mountain on May 18, 1980. This rock is a fairly large piece of "breadcrust" lava from the deposit of an andesitic pyroclastic flow (rock and ash flow) that descended the southwest flank of Mount St. Helens approximately 9 km from the pre-1980 summit. Tree-ring dating techniques bracket the age of the deposit between AD 1489 and 1556, about 450 to 500 years ago.

Stop 10

 Retrace your steps to the Antarctica rock and continue left to the corner of Building 1, turn right at the corner of Building 1 and continue walking until you are almost to the courtyard of Building 2. On your right is a large

specimen of **blueschist**, a metamorphic rock collected in Marin County, located north of San Francisco. The minerals that make up the rock, including small garnets, and the folded structure of the rock show evidence of immense pressure when the rock was being formed about 160 million years ago. A polished slice of the same rock at its base shows off the highly folded structure. Its name reflects the abundance of a blue mineral called glaucophane; its glittery look is from muscovite mica. Laboratory experiments tell scientists the temperatures and pressures under which these minerals are created, and, in turn, those minerals help scientists reconstruct the geologic setting in which the rock was formed. The presence of blueschist in Marin County is a clue to the tectonic history. Before there ever was a San Andreas Fault, California was the site of a subduction zone, where one of the Earth's major tectonic plates was being subducted, or consumed underneath the North American Plate.



To the right of the blueschist is a most unusual tree, the **Dawn Redwood** (*Metasequoia glyptostroboides*). This is a deciduous conifer that was common in Asia and North America until a few million years ago. This species of tree was believed to be long extinct by western scientists until a small grove was discovered in China in 1946. Since that time, seedlings have been planted in various parts of the world, and we feel privileged to have one of the trees on the USGS campus. Unlike the two California species of redwood, the needles of this Dawn Redwood turn brown in autumn and fall from the tree, to be replaced with new foliage each spring.



To the left of the blueschist are two **Giant Sequoias** (*Sequoia gigantea*) or mountain redwoods. They are planted in soil brought here from their native environment on the western slope of the Sierra Nevada. The native soil is crucial to their growth and health because Giant Sequoias prefer glaciated soil.

Stop 11



Continue walking into the courtyard of Building 2 and enjoy the numerous varieties of **rhododendrons** and **azaleas**. A **Ginkgo** tree (*Ginkgo biloba*) with the fan-shaped leaves is located in the center planter. The Ginkgo's history goes back to at least the early Mesozoic Era (starting about 240 million years ago); this is the only surviving species of this entire plant order. Under the Ginkgo is a small plaque to Roland Brown, a USGS paleobotanist who studied fossilized plants.

Stop 12



Retrace your steps to the walkway between Buildings 1 and 2. To the left of the entrance of the Wisteria (*Wisteria frutescens*) arbor, you will see a large boulder of **orbicular diorite** from the Sierra Nevada in which the rounded "orbs" crystallized before the surrounding rock solidified. Although geologists understand how molten magma cools and crystallizes into solid granitic rock,

this particular type of diorite presents many mysteries as to exactly how the orbs solidified. Note the various textures within some of the orbs. Some orbs are stratified or layered internally, while others are homogenous throughout. The question remains—What was happening in the magma chamber while this rock crystallized?

 In late April and early May, the shiny gray and black of this obicular diorite is framed by the red and white blossoms of the surrounding **rare rhododendrons**, “Mi Amor” and “Beauty of Littleworth”, as well as a rare deciduous tree, a **Veitch Magnolia**, (*Magnolia X. veitchii* ‘Peter Veitch’), hybridized in 1907 from the Himalayan species *M. campbellii* and *M. denudata*, to the left of the diorite.

 Continue walking under the Wisteria arbor between the buildings. At the end of this arbor is a large slab of polished New Hampshire **granite**, containing a large pegmatite vein. The gray mineral is quartz, the black mineral is biotite mica, and the white and pink crystals are different feldspars. The slab is a gift from Stanford University and matches one in the Stanford School of Earth Sciences.

 Take a moment to look around on other side of the granite slab and notice the steel bracings on Buildings 1 and 2. These braces were added to the buildings in 1979 as structural reinforcement to reduce the effects of ground shaking during an earthquake. During the 1989 Loma Prieta earthquake, the bracings proved their worth as neither building suffered any serious damage.

Stop 13

 From the Wisteria arbor enter Building 1. Inside on either side of the hallway, you will find exhibit cases containing specimens of rocks and minerals from all over the world, including two cases devoted to California minerals and one case displaying exotic animals and mineral deposits from submarine hot springs at mid-ocean ridges. Interspersed with the cases are posters about USGS research.

 Turn into the second hallway on your left and enter the world of Pacific coastal and marine geology. On the walls of this corridor are photos of fish, other sea creatures, and volcanic rock formations filmed more than 3 miles beneath the surface of the ocean. In the video window is changing footage on current coastal and marine research. Cases along the corridor contain specimens collected by USGS scientists, including intricately patterned sand layers from a beach in the Grand Canyon; rocks and fossils from Monterey Bay; and iron-manganese nodules from the deep Pacific Ocean. One case includes “shrunk heads” (styrofoam heads used for displaying wigs) and tiny styrofoam cups that were compressed by ocean pressures when attached to the outside of the submersible *Alvin* on a dive to the deep-sea floor.

Stop 14

 Exit Building 1 and walk toward the main flagpole, which is surrounded by a garden of drought-tolerant plants. Before crossing the street, look to your left and you will see a tall communications tower over Building 11, which is the nerve center of the USGS Northern California Seismic Network. Microwave radio antennae on this tower receive signals of earthquake shaking from widely scattered seismometers and feed those signals automatically into computers for rapid analysis of an earthquake's location and preliminary magnitude.

 To the right of the flagpole, at the end of the short sidewalk, is a **USGS benchmark** "WMC 1994" that can be used to set your hand-held Global Positioning System (GPS) receiver (see ESIC for handout). A GPS receiver is a powerful new tool used by surveyors, map makers, and recreational users. Using satellites orbiting at 12,500 miles above the earth, a GPS receiver automatically triangulates positions by calculating a distance from four or more satellites.

 Just beyond the benchmark are three granite boulders donated by the U.S. Forest Service. They are from Sonora Pass in the Sierra Nevada. The source of the rocks is magma (molten rock from deep within the earth) that was intruded into the overlying rock about 86 million years ago, during the Cretaceous Period. The largest boulder on the right weighs nine tons, and all three specimens display large phenocrysts (crystals) of orthoclase feldspar as much as four inches long. Such large crystals formed only in the largest masses of granitic rock, where cooling was the slowest. What's the biggest crystal you can find?

This completes your tour. We hope that you will have time now or someday in the future to return to the ESIC for an extended time of browsing among the maps and publications; return to the library to browse among the 400,000 volumes; or take a closer look at any of the geologic or botanical specimens and pleasant spots along the tour.

We hope you have enjoyed your tour of the USGS and that you will come back often to view our changing hallway and Visitor Center exhibits.

The USGS Western Region Center sponsors a free monthly public lecture, usually held on the last Thursday of each month. These presentations focus on science topics ranging from maps to meteorites to marshland ecology, and are presented by USGS scientists in non-technical terms. The lectures begin at 7 p.m., and on those evenings, the ESIC remains open until the start of the lecture. Dates and topics may be checked by calling 650-329-5000 or by picking up a flyer in ESIC.

Please help by recycling this tour booklet.

**If you have no further use for this booklet,
you may return it to the Visitors Center in Building 3.**

Western Region Center Sources of Information

All phone numbers listed below are in the **650** area code.

Telephone Switchboard, 853-8300

Hours: M-F, 7:45-4:15

Earth Science Information Center, 329-4390 or 1-888-ASK-USGS

Hours: M-F, 8:00-4:00

General information and sales of maps, books, digital data, and photography

Library, 329-5027

Hours: M-F 8:00-4:30

Open to the public for reference use

Public Affairs, 329-4000

News media services

Public Events Calendar, 329-5000

(recorded message)

Speaker and Tour Requests, 329-5392

Earthquake Information, 329-4025

Recent earthquake activity in northern and central California
(recorded message)

Ask-a-Geologist, Ask-a-Geologist@usgs.gov

Electronic mail inquiries

Personnel, 329-4104

Hours: M-F, 7:45-4:15

Website, <http://www.usgs.gov>