Notice how some of these alluvial fan rocks look painted. This is desert varnish, a microscopic bacteria that grows extremely slowly and gives older rocks coatings of black, brown and red.

MILE 3 4 +.4

Borrego Badlands Overlook

Turn into the parking loop on the right. This overlook was the epicenter of the 1954 Santa Rosa Mountains Earthquake. That quake measured 6.2 on the Richter Scale. Big quakes are common along the San Jacinto fault zone. Since 1890, it has produced at least ten earthquakes that reached a magnitude of 6.0 or higher.

You're looking over the Palo Verde Wash and the folded and faulted hills of the eastern Borrego Badlands. Here you'll see red clays and silts deposited by the Colorado River about a million years ago. The brown sands and gravels came from the Santa Rosa Mountains behind you.

MILE 3 4 +.7

Faults, Fans, Fossils and Flooding

The Clark Fault tips up the sediments here so you can see the sands and gravels from an Ice Age alluvial fan. A fossil graveyard is buried inside the layer upon layer of sediments. Cheetah, camel, horse, ground sloth, and mammoth have left behind bones and teeth that have become mineralized over time and are now fossils.

Note: Just ahead on the right is the Arroyo Salado Primitive Campground. Vault toilets are available here.

MILE 3 6 +.2 Turnoff on left

Truckhaven Rocks

The big, reddish-brown, sandstone rocks in the distance are some of the oldest sedimentary rocks in the park. Called Truckhaven Rocks, they are four to five million years old. At the base of these rocks there are steep walled gorges and slot canyons. The area you're looking at is a wilderness that connects Anza-Borrego with the Santa Rosa Mountains National Monument. It is important habitat for bighorn sheep, mountain lion and other plants and animals.

As you drive east from here, notice how the flat land around you is being carved into "fingers". These ravines separated by skinny hills are called *barrancas*.

Can you see the mosaic of pebbles, cobbles and boulders that top the fingers? This surface covering is called "desert pavement". Strong winds and rainfall blow and wash the sand away, leaving only the rocks behind.

MILE 3 8 +.2

Calcite Mine Scenic Overlook

General Patton's troops built the original road that leads north from here to the former Calcite Mine. Active during World War II, it was the top producing calcite mine in North America.

Why was it so important to the war effort? Calcite is a form of calcium carbonate. When you strike a calcite crystal, it will break into pieces that have exact angles and clear, flat, sides that provide double refractive properties. The Polaroid Company processed these into optical ring sights for the military. Gunners and torpedo bombers depended on calcite ring sights for the most accurate aim available.

Today, you'll find a honeycomb of calcite veins and lots of empty pockets where the miners have been.

This is the end of our tour.

We hope you've enjoyed experiencing the beauty and power of geological processes at work along this "Erosion Road." For more information, join park naturalists for a tour or view our selection of books for sale at the park visitor center.

written by Paul Remeika and Joanie Cahill
photo by Paul Remeika

Driving Tour Guide

EROSION ROAD

Join us for a driving tour through the dynamic landscapes of Anza-Borrego Desert State Park®.

This one-way, 21 mile tour leads from the Park Visitor Center east along S-22, through the spectacular Borrego Badlands and takes about an hour. Along the way, you'll witness geologic forces at work, creating a landscape that is always changing.

For millions of years, tectonic activity has pulled apart the earth's crust. Mountain masses move up and around on great fault lines, while weathering and erosion tear them down. This on-going conflict creates land features like canyons, bajadas, playas and arroyos... desert landscapes as colorful as their names!

Welcome to the Erosion Road

Each of the 12 stops is identified by the mileage marker that precedes it plus the fractional mileage from that marker. Ask Park staff about road conditions before venturing off the paved highway. All of the dirt roads in this area have large boulders, soft sand or other hazards.

Our first stop will be just past the airport at Milemarker 23 on Palm Canyon Drive (S-22).

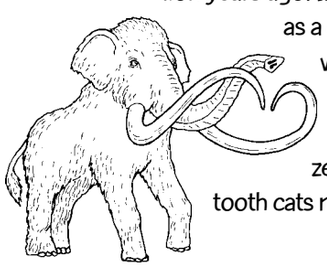
MILE 23

Font's Point View

Nature's power creates a striking sight as faulting lifts this point up and erosion wears it down and carves it out.

Can you see the different colored layers of sediments that make up Font's Point and the Borrego Badlands? The reddish-brown and greenish layers on top are sediments that deposited on alluvial fan flood plains from 300,000 to a million years ago.

Below them, the pinkish-brown layers are sediments from the bottoms of fresh water lakes that were here from one million to three million years ago. Imagine this area as a grassy savannah with lakes and streams. Mammoths, sloths, zebras and sabre-tooth cats roamed the land.



MILE 27

Coyote Mountain

To your left, Coyote Mountain now stands alone, but was once in line with the rest of the Santa Rosa Mountains. The earth's crust is stretching and shifting sideways here along the San Jacinto Fault, moving this mountain towards you. The San Jacinto fault zone is the most seismically active in California, causing three or four tiny quakes here each day.

This mountain is actually tilting back as another, smaller fault lifts up this side. Although the mountain is young, its rocks are old. The reddish-brown rocks you see are about 400 million years old. About 100 million years ago, gigantic blobs, (several miles wide) of molten magma pushed through the sediment. These injections cooled and hardened into the light gray (granite) rocks that are visible.

MILE 28

Clark Dry Lake

On your left, mountains surround Clark Valley. This little valley is sinking as the mountains around it rise up.

Park Sign

Notice the white patch at the bottom of the little valley to your left. This is Clark Dry Lake. A hundred thousand years ago there was a lake here year 'round. Now, when heavy rains create a lake for only a few days, tadpole shrimp, freshwater clams and other tiny creatures come to life.

Today, salts and other fine minerals line the lake bed. As waters flow down the mountain and across the plateau, all but the finest sediments drop out. The salts dissolve in the water, and as a result, lots of salt makes its way to the lake. As the water evaporates, these white minerals are left behind.

The term *"playa"* describes a temporary lake that has no outlets and evaporates completely. Clark Dry Lake is one of the many playas in Anza-Borrego Desert State Park.

MILE 29

+.4

Desert Arroyos

If you visit the Park in late summer, you'll likely experience an afternoon thunderstorm. During this "monsoon" season, intense rains produce flash floods as water gathers in temporary stream beds or "washes". Also called *arroyos,* these channels drain into Clark Dry Lake. Do you see any signs of recent flooding?

The soil here is called "caliche-mottled hardpan". Caliche is a natural calcium carbonate cement that forms in dry climates. Over time, water breaks it down into soft sand.

The road up this wash takes you to the tip of Font's Point. No trip to Anza-Borrego is complete without a visit to this overlook, but be sure to ask about road conditions before trying it without a four-wheel drive vehicle. If you have time and the right vehicle for this 8 mile round-trip excursion, you'll be treated to spectacular views of the Borrego Badlands.

MILE 30

+.9

Turnoff on left

Lute Ridge

The low rolling hills of Lute Ridge stand between you and the Santa Rosa Mountains. This ridge is the sign of the Clark Fault which runs right underneath it. Clark Fault is a "strike-slip" fault. This means that lands on either side of the fault are moving in opposite directions. They push against each other until one finally slips and slides up. Usually there is one big movement followed by several smaller adjustments.

Clark Fault is a branch of the San Jacinto fault zone. This zone is the most seismically active in California. Each year, over 1,000 earthquakes are measured here.

MILE 32

+.2

Bajada View

Looking back across the highway and to the left, you'll see the steep face of the Santa Rosa Mountains lifting up along Sierra Ridge and Clark faults. This range has been rising up for a few million years. The highest point, Toro Peak, is over 8,700 feet.

Wind, rain, heat and cold constantly attack the mountain's surface rock, wearing it down and dissolving it. Once loosened, wind and water carry the rock particles down the slopes. Eventually they make a cone-shaped pile of rubble at the bottom called an *alluvial fan.* At the base of these mountains,the alluvial fans overlap each other. The raised plain that joins the fans together is called a *bajada.*