Guadalupe Mountains

National Park
National Park Service
U.S. Department of the Interior

Geologic Time & Rock Formations

Era	Period	Epoch	x Million Years Ago
Cenozoic	Quaternary	Holocene/Recent	0.01
		Pleistocene	2
	Tertiary	Pliocene	5
		Miocene	24
		Oligocene	37
		Eocene	58
		Paleocene	66
Mesozoic	Cretaceous		144
	Jurassic		208
	Triassic		251
Paleozoic	**Permian**		292
	Pennsylvanian		320
	Mississippian		354
	Devonian		417
	Silurian		440
	Ordovician		495
	Cambrian		570
Precabrian	Proterozoic		2500
	Archean		4500

Period	Series	Formation	Features in Each Formation
Permian	Lopingian	Rustler (not in park)	Hills West of Dark Canyon Road on way to Dog Canyon
		Salado (not in park)	Waste Isolation Pilot Project (WIPP) East of Carlsbad, NM
		Castile (not in park)	First Roadcut North of the State Line
	Guadalupian	Carlsbad Group: Tansill	Top of Permian Reef Trail
		Yates	Guadalupe Peak The Bowl
		Seven Rivers	Bush Mt. Dog Canyon
		Capitan	Top of Patterson Hills, El Capitan, Shumard Peak, McKittrick Canyon Walls, Smith Spring McK Canyon Floor and Mouth
		Cherry Canyon	Choza Spring, Frijole Ranch, Manzanita Spring, and Pine Springs
		Brushy Canyon	Delaware Mountains Salt Basin Overlook
		Cut Off	Cut Off Mountain Stratotype Canyon
	Cisuralian	Victorio Peak / Bone Spring	Williams Ranch

What is a Formation?

A **formation** is a body of rock strata that consists of similar rock material formed under similar conditions. Formations may be combined into **groups** or subdivided into **members**. They are usually named for the area in which they were found, a nearby city or by descriptive names chosen by the geologist describing them.

What is a Stratotype?

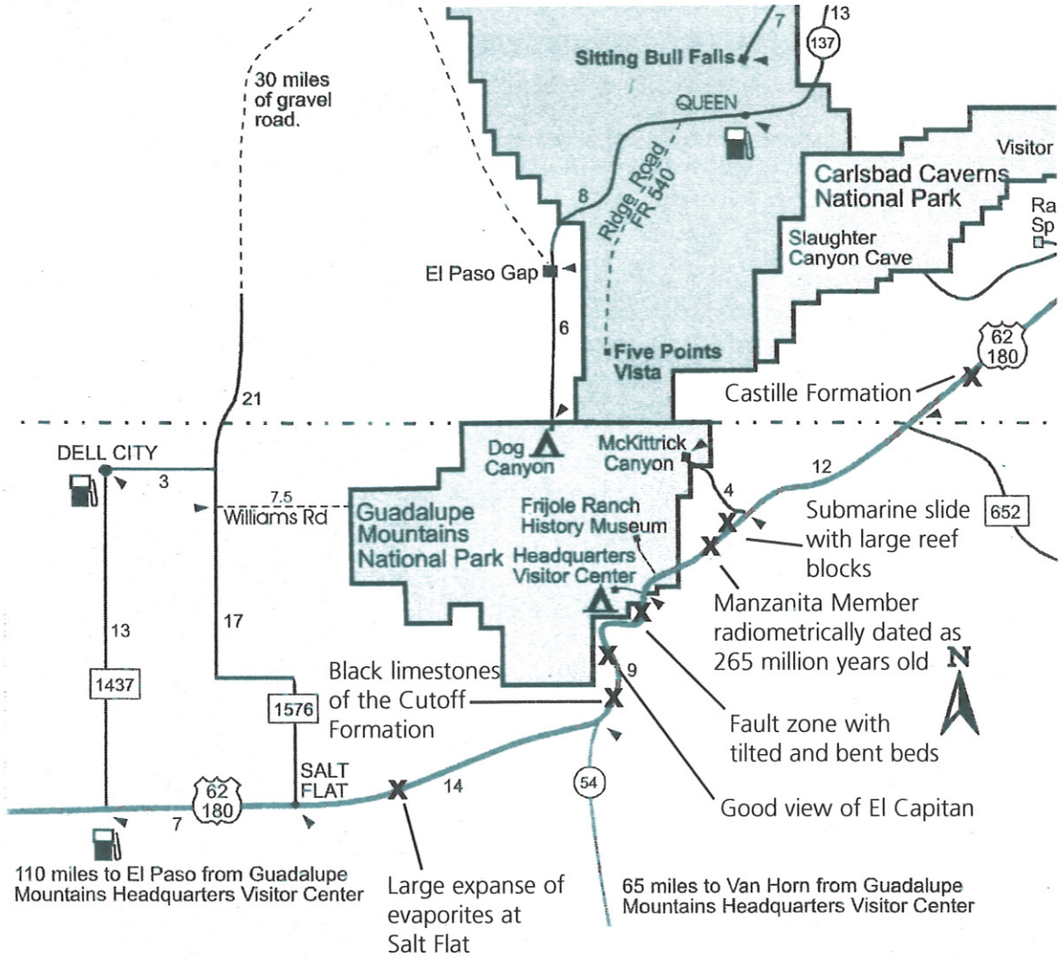
A stratotype is the representative example of a group of rock beds used as a measuring standard. Rocks from around the world of the same age are compared against this standard.

The Guadalupe Mountains have lent their name to the Geological Time Scale. Three localities within the park were recognized by the International Union of Geological Sciences (IUGS) in 2001 as the best representatives of middle Permina times (260-270 million years ago).

Stratotypes allow researchers to compare rocks to determine their age relative to major worldwide geological events, such as sea level changes, glacial periods, or biological extinction events.

Points of Interest Along the Highway (Eastbound from Pine Springs)

5.5 miles—The road goes through Manzanita member of the Cherry Canyon Formation. The Manzanita member is mostly limestone, but it also contains beds of volcanic ash that have been radiometrically dated as 265 million years old.



6.1 miles—Large gray blocks of reef, some as large as a car, surrounded by tan sandstone layers. This is debris from a submarine slide, perhaps triggered by an earthquake.

21 miles—The Castille Formation is composed of alternating light bands of anhydrite (altered gypsum) and dark limestone. These evaporites filled the basin.

Text by Bill Hood and Gorden Bell

How are Stratotypes Recognized?

A global stratotype has to be the best of the best rocks of a certain age. To qualify as a stratotype, the rock beds in Guadalupe Mountains National Park had to meet several criteria.

- The rock beds have had long, in-depth study by geologists.
- Many excellent fossils, including some with uninterrupted evolutionary sequences, have to be present.
- The beds have reliable radiometric age dates.
- The rocks formed in a wide variety of ancient marine environments.
- Sediments were deposited continuously over long periods of time with few gaps due to erosion.
- International researchers will be guaranteed permanent access to the selected rock beds.

Points of Interest Along the Highway (Westbound from Pine Springs)

0.4 miles—Fault zone with tilted and bent rocks displayed on right side of road.

Double rest area—Good view of El Capitan, Brushy Canyon Formation, and basin strata in surrounding area. Large boulders across highway are alluvium from a flood.

7.4 miles—Small roadcut in black Cutoff limestone. This formed in the basin and is the oldest basin rock you will see.

17 miles—Edge of Salt Flat, a playa lake. Evaporation of the lake has left deposits of gypsum and salt.