

## *Volcano Trail*

**2. Tree Holes** Tree holes were formed as the lava from Bandera Volcano began to flow into the surrounding area. Geologists and Biologists tell us that the flora and fauna of the time was essentially the same as they are today. This tree hole was formed as the lava flowed around a tree that existed here (Douglas Fir or Ponderosa Pine) and solidified quickly around it. The tree itself burned up leaving the hole as you see it today.

### **3. Spatter Cone**

This type of lava formation is called a spatter cone. Spatter cones are formed when minor vents form in the molten lava. A surge of hot air rushes through the lava forming surface tubes and minor vents. When the air breaks through the surface, lava will splash out forming the type of cone that you see here.

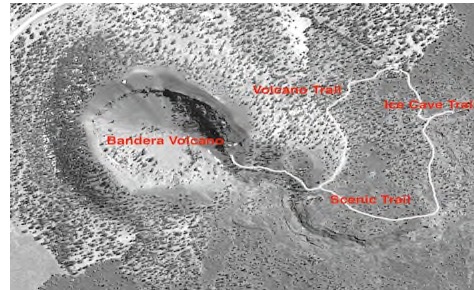
### **4. Area Wildlife**

This is a good spot to see a variety of wildlife that inhabits this area. You will most likely see chipmunks, squirrels, lizards and birds during the day. In the mornings and evenings you might spot deer and elk. Occasionally a bear or a mountain lion will wander through here. During the summer it is not uncommon to see a bull snake on this trail. Birds that are common in this area include: American Robin, White-breasted Nuthatch, Brown Headed Cowbird, Dark-eyed Junco, Black-headed Grosbeak, Mourning Dove, Hummingbirds, Acorn Woodpecker, Stellar's Jay, and Wild Turkey.

### **5. Volcano Land**

If you look off into the distance you will see a number of other volcanoes that make up the El Malpais region. There are 29 volcanoes in this area. From this point you should be able to see around 15 of them. Starting from your right, southwestern side, there is Bandera's twin, Cerro Bandera (the largest, closest one). Moving to the East, the closest ones are: Arizona, Comadre, Americana, Rendaja, Leonides, Hoya De Cibola, Hueto, Lost Woman, Twin Craters, Lava Crater, El Calderon and Candelaria Crater.

**6. A Cinder Cone Formation** Here you see a cross section of Bandera volcano. This volcano is a cinder cone. The volcano began as the earth started to swell. Eventually a crack broke open and high pressure lava began spraying out. The molten rock hardened in mid air and fell back down to the ground as cinders. As the eruption continued, the cinder cone got larger and larger. What you see here shows the various sized cinders that make up this mountain.



### **7. Leaching Lava**

As lava ages, the various elements within the rock leaches out. Elements present in most lava include: oxygen, silicon, iron, aluminum, calcium, magnesium, sodium, sulfur, potassium, titanium and other trace elements. Here you see calcium (white), sodium and sulfur (yellows), and iron (red) leaching out of the rock.

### **8. Devil's Playground**

Below, you see the beginning of the Bandera lava tube system. That is the large canyon that snakes out from the crater. This section of lava flow illustrates how violent this eruption must have been. Early sheepherders called this area "devil's playground." The lava is very sharp, jagged, and makes good shelter for rattlesnakes. Notice the columnar jointing of the lava here!

### **9. Volcano Look Out Point**

Bandera is the largest volcano in the region. It erupted around 10,000 years ago. There were two stages of the eruption: first the cinder cone developed, then a massive lava flow broke out this side. The molten lava reaches temperatures above 2,000 degrees Fahrenheit. Bandera's lava

flow is nearly 23 miles long. At the end of the eruption, the lava suddenly fell back down the main vent making the bottom of the cone deeper than the outside lava flow. This crater is nearly 1,400 feet wide at the top and roughly 800 deep. The elevation at the look out point is 8,036. The elevation at the rim is 8,367. Over time, erosion and gravity take their toll on the crater and it is slowly filling up as cinders and rocks fall down into it. This makes for a very fragile environment. Please do not go beyond this look out point, it is not only dangerous but is also very damaging to the cinder cone.

## *Scenic Loop Trail*

### **10. Bandera's Lava Flow**

The lava field seen here is made up mostly of 'A'a lava. 'A'a lava is composed of jagged, broken lava produced when the surface of the flow cools and hardens while underlying lava is still in motion. This region is called El Malpais which is Spanish for "the bad lands." Pueblo Indian legend has it that the lava flow was the blood of the Kachina KauBat.

### **11. Trees in the Area, and Ancient, Twisted Trees**

There are several varieties of trees that grow in this area. The Ponderosa and Piñon Pines are the most predominant. The young Ponderosa Pines have black bark and are called "Black Jack Pine." When the Ponderosa matures its bark turns a golden orange color. There are several very old Ponderosa Pines in this area. The oldest Ponderosa Pines are around 500 years old. Douglas Fir trees are also prevalent. The Douglas Firs have the classic Christmas tree shape with tighter pine cones. The older ones in this area often have dead tops. Another common tree to this area is the Alligator Juniper. These trees are named for the texture of their bark. They are bushier and grow to be over 1,000 years old. You will also see stands of Gambals Oak. There are a few above the trail on the side of the volcano. Along the side of the trail you will see white barked trees with coin shaped leaves. These are Aspen. In the Fall, the leaves of the Aspen and the Oaks will turn yellow and orange. The trees growing in lava find it hard to establish deep roots. The results are that the trees grow to be twisted and gnarled. Also, the shallow roots fail to support the trees in strong winds. You can see several fallen trees along the trails.

Yet the lava protected many trees from the loggers in the early days.

**12. Types of Lava** The Bandera Lava Flow consists of three types of lava. A'a is the very rough and jagged lava which is predominantly a fast moving and cooling lava flow. A'a was named in Hawaii for the sound you would make when trying to walk on it barefooted. Pahoehoe is the swirled Looking ropy lava seen in front of you. Clinker lava is the type seen here that looks like plates stacked one upon another.

### 13. Surface Tubes and Vents

Surface tubes are small drained rivulets, or runners of the same highly fluid lava that flows in lava channels. They form on an existing hardened surface. They usually form when vents, channels, or reservoirs of lava overflow. Another point of interest, you are standing on the top of the actual lava tube ceiling that formed the Ice Cave.

### Ice Cave Trail

#### 14a & 14b Human Habitation

The circular stacks of lava that you see in this area are ancient Pueblo ruins. If you look carefully you can see stacks of lava rocks forming a wall in front of the small cave. The cave is actually a surface tube. The insulating properties of the lava made for ideal shelter. The ancient artifacts displayed in the trading post were found in ancient ruins such as this. The artifacts were found in the 1940's and 1950's.

#### 15. Lava Tubes

This is a section of collapsed lava tube. A lava tube is formed when the molten lava pours out of a volcano. The surface hardens, while below, the lava continues to flow. The porous lava acts as an excellent insulator and keeps the lava hot beneath the surface. This creates a pipeline of lava known as a lava tube. This is the Bandera lava tube. Its overall length is 17.5 miles and is considered to be the longest in North America. Most of the lava tube has collapsed, but there are caves here and there such as the one below. On the other side of the tube you will see two logs. Those made up one of the original ladders used to climb down

into this cave. Please use the hand rails as you descend the stairway and watch your step.



#### 16. Lichen and Alpine Moss

The greens and oranges that you see on the lava are lichen and moss. The moss here is an Alpine Moss and is very rare this far south. The scaly looking green and orange growth is lichen.

#### 17. The Ice Cave

The temperature in this cave never gets above 31 degrees Fahrenheit. As rain water and snow melt seep into this cave, the ice floor thickens. The floor of the ice is approximately 20 feet thick. The deepest ice is the oldest and dates back 3,400 years. The green tint is caused by an Arctic algae. The back wall was formed in the early days when ancient Indians and early settlers mined the ice. In 1946, ice removal was stopped. At that time the ice wall was nearly 12 feet high. Since then, the ice floor has risen relative to the back wall. The rate of ice accumulation varies with annual rainfall. The cause of original formation of ice 3,400 years ago is not known for sure, but was most likely due to annual rainfall. However, perpetuation of the ice is due to a combination of existing conditions that make a natural ice box: 20 feet of ice in a well insulated cave shaped to trap frigid air. The Ice Cave was known to the Pueblo Indians as the winter lake.

**To help preserve this delicate environment, please stay off the ice. Do not disturb or pick up Lava, Plant or Animal Life!**

**Visit our website at [www.icecaves.com](http://www.icecaves.com)**



<- Ice Cave

Volcano ->

### Ice Caves Office and Store. Register Inside

Welcome to the Ice Cave and Bandera Crater. We have two trails that begin in front of the trading post, and we have also added a scenic loop that connects the two. **The scenic loop is slightly more rugged, so please use your discretion.** All trails begin and end in front of the trading post. To the West, the trail leads to Bandera Crater. To the South, the trail leads to the Ice Cave. Along the way, are numbered markers that correspond to this trail guide. You may take either hike first. **Please remain on the trails, making sure to leave the lava and plant life as you see it and please do not litter.** You may keep this pamphlet as a souvenir, otherwise, please return it so that it may be used again. Thank you and enjoy your hike.

#### 1. The Old Time Trading Post

The trading post was built in the 1930s along with a saloon and dance hall. At the time, the Zuni Mountain Railroad was operating and the logging industry was in full swing. They kept their beer cold using ice from the Ice Cave. In 1946, Dave and Reddy Candelaria arrived and began operations as a tourist attraction. The trading post deals in jewelry, pottery, rugs and other art of local Indian Tribes. In addition to contemporary Indian Arts, the historic trading post has ancient artifacts on display. Most of these were found in the lava, and date back 800 to 1,200 years.

**PLEASE REMAIN ON THE TRAILS  
AT ALL TIMES**