

# PERLITE AND THE STORY OF THE SOCORRO NEW MEXICO PLANT AND QUARRY

## GENERAL

Perlite is a hydrated glassy volcanic rock, which has the unusual characteristic of expandability. When rapidly heated the rock explodes in a manner similar to popcorn. The resulting white, frothy, lightweight, relatively inert product may be used as a filter aid, filler, or light weight aggregate.

## PERLITE

The commercial term "perlite" is used to describe any naturally occurring igneous rock that upon rapid heating will expand or "pop". In the geological usage the term is reserved for a type of volcanic glass that exhibits a concentric onionskin structure containing from 2% to 5% combined water, and having a pearly luster. The color of perlite is generally gray-blue but red, green, black or blue varieties occur. The composition of perlite corresponds to that of rhyolite. Listed below is the average composition of perlite from several mines in the United States.

SiO <sub>2</sub> .....	74
Al <sub>2</sub> O <sub>3</sub> .....	13
K <sub>2</sub> O.....	5
Na <sub>2</sub> O.....	3
Total Fe.....	1
Water.....	4
	<hr/>
	100%

Perlite is metastable, eventually with age like any glass it will devitrify into microcrystalline quartz and feldspar. Due to the instability of perlitic glasses, most occurrences are generally of Tertiary or Quarternary age (less than 50 million years old).

Perlite is formed by the hydration of rhyolitic obsidian, a rock which is the result of rapid chilling of molten lava. The volcanic origin of perlite creates occurrences of perlite rock as dikes, domes, sills, or flows. Economically, dikes and sills of perlite are generally too small to be of value. Flows of a hundred feet thick and covering several miles do occur. Occasionally some domes are thousands of feet across and several hundred feet thick. The bulk of the perlite produced in the United States is from domes or flows.



Figure #1. Volcanically Active Type Region

### GEOLOGIC HISTORY AT SOCORRO

During the last 40 million years, the Socorro area has experienced extensive volcanic activity (See Figure #1). About 27 million years ago a cataclysmic volcanic eruption occurred at Socorro (See Figure #2). Hundreds and perhaps thousands of cubic miles of material were blown out of a large volcano or caldera. Ash was deposited as far east as Kansas and Oklahoma. The eruption was similar to Mt. Saint Helens only many times larger. So much material was ejected from the volcano that the area collapsed when pressure was reduced. The result was the Socorro Caldera, a depression approximately 12 miles in diameter (See Figure #3 & #4). The northeast edge of this collapsed caldera can now be seen on the northeast side of Socorro Peak, near the School of Mines "M".

Until about 12 million years ago the area was relatively quiet; at that time pressure began building again. Around 7 million years ago the Grefco dome was emplaced (See Figure #5). The emplacement of the Grefco dome may have taken many years due to the very high viscosity of the magma. After the Grefco dome was emplaced and cooled, the eastern edge was down faulted it is thought that about  $\frac{1}{3}$  of the original dome is gone (See Figure #6).

About 4 million years ago the area was covered by a basalt flow. This flow originated about 4 miles to the west of the Grefco dome. The area was experienced some minor faulting in the last few million years. Lastly, the area has been weathered and eroded to the present topography (See Figure #7).



Figure #2. Volcanic Eruption

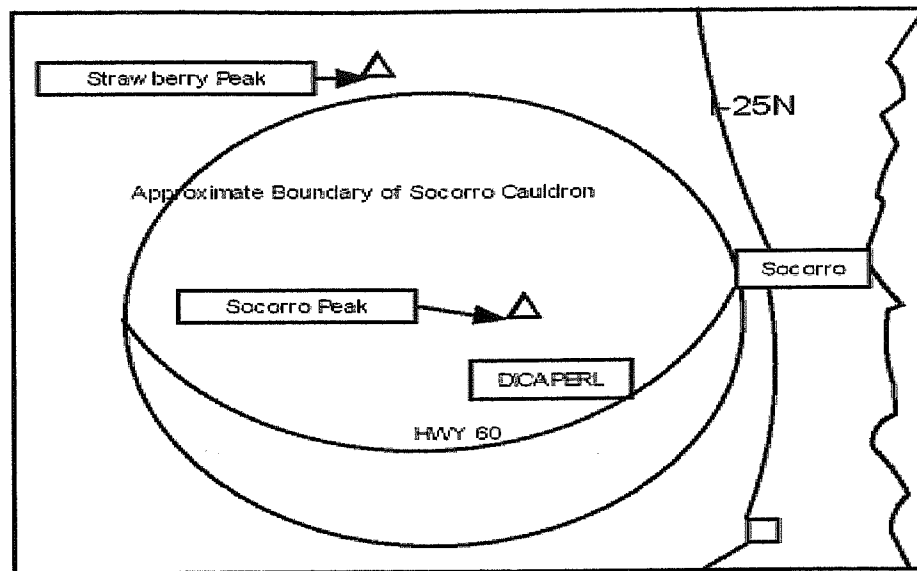


Figure #3 Location Map of Dicapertl Perlite Mine

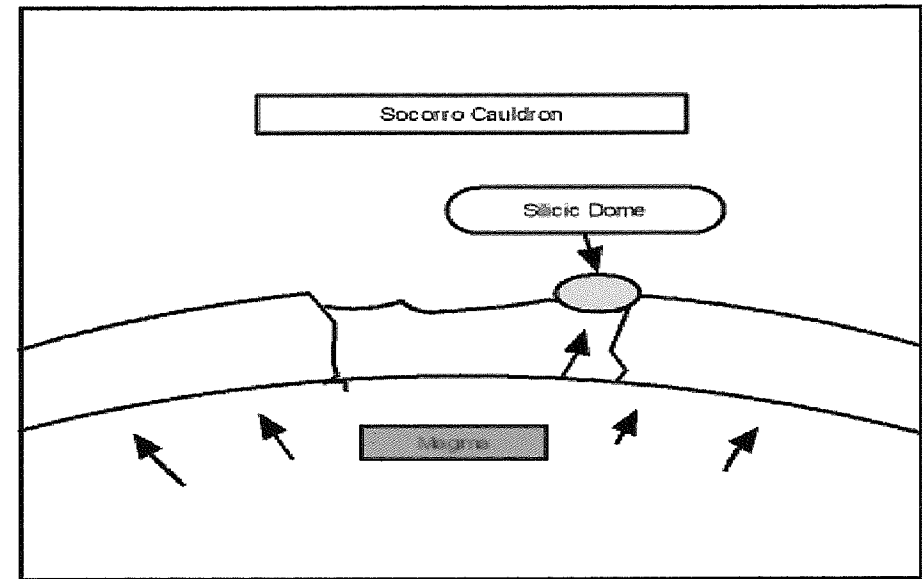


Figure #5 DICA PERL Dome Emplacement

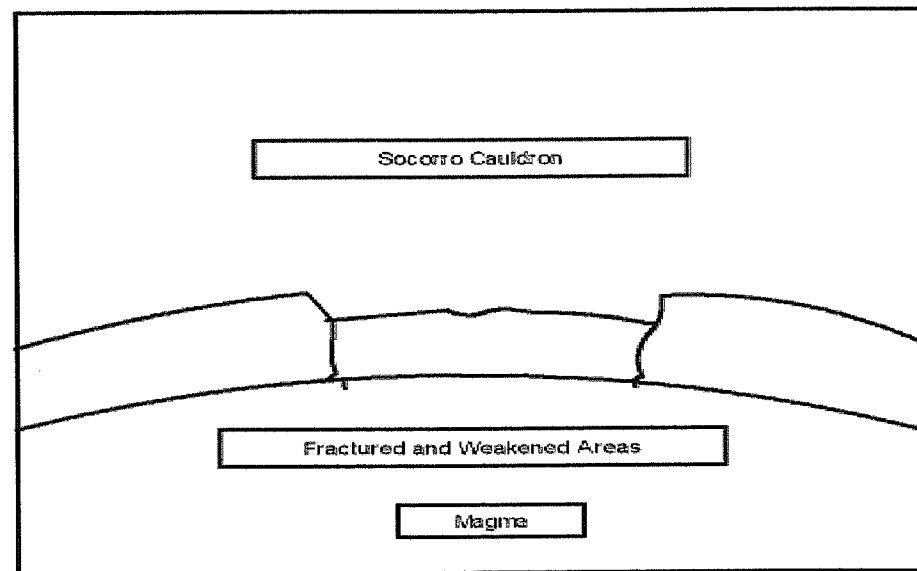


Figure #4 Socorro Cauldron Collapse

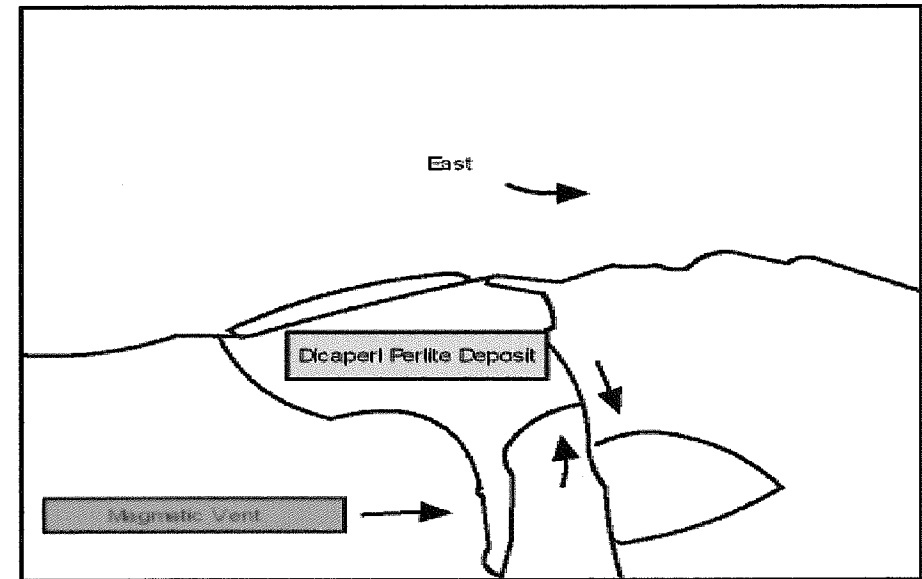


Figure #6 Faulting of DICA PERL Dome



Figure #7. Present Day View

## HISTORY OF PERLITE PRODUCTION

The United States perlite industry began in 1946, when production was reported at 4750 tons. This initial production came mainly from Arizona. In the early years most of the perlite was used in the construction industry as lightweight aggregate or thermal insulation.

During the years 1947-1957 the industry experienced very rapid growth as new uses of perlite were developed. The Socorro deposit of Great Lake Carbon Corporation took part in this growing industry. Located 4 miles southwest of Socorro, this deposit was the first source of New Mexico perlite. Production began in 1949. In 1958 a filteraid expansion furnace was added to the facility. In 1961 operation at Socorro was suspended.

The closing of the Socorro Plant in 1961 was due to changing market conditions. Perlite sales were shifted to Grefco's perlite mine in northern New Mexico. In 1975 the Socorro perlite plant went back into production with a brand new plant.

## MINING AND PROCESSING

The first step in producing marketable perlite is mining. At Socorro the perlite is mined with open pit methods, (See Figure #8). Removal of overburden begins the process. Overburden is typically about 10 feet thick and is made up of soil, contaminated perlite and occasional basalt boulders. Removal is accomplished by simply pushing the overburden to the side, except when the edge of the deposit is more than 200 or 300 feet away, then removal is by scrapers.

Following overburden removal of the perlite is broken using a bulldozer mounted ripper. The broken perlite is then loaded into scrapers and hauled to the grizzly.

The relatively simple geologic history of the Socorro ore body has provided a relatively uniform perlite. However, there are slight differences in the perlite from one part of the quarry to another. These differences have been recognized by visual inspection, numerous drill holes, characteristics that are looked for are the expanded density of the perlite and the strength of the perlite particle.

Mining plays an important part in the quality control of the finished perlite product. From 1975 until 1984 the mining was simply done by bulldozing perlite ore into the grizzly. This type of mining resulted in a well blended uniform plant feed. During the last few years the distance that the ore has to be moved to the grizzly has increased. Increased haul distance has resulted in the introduction of scrapers to the mine fleet.

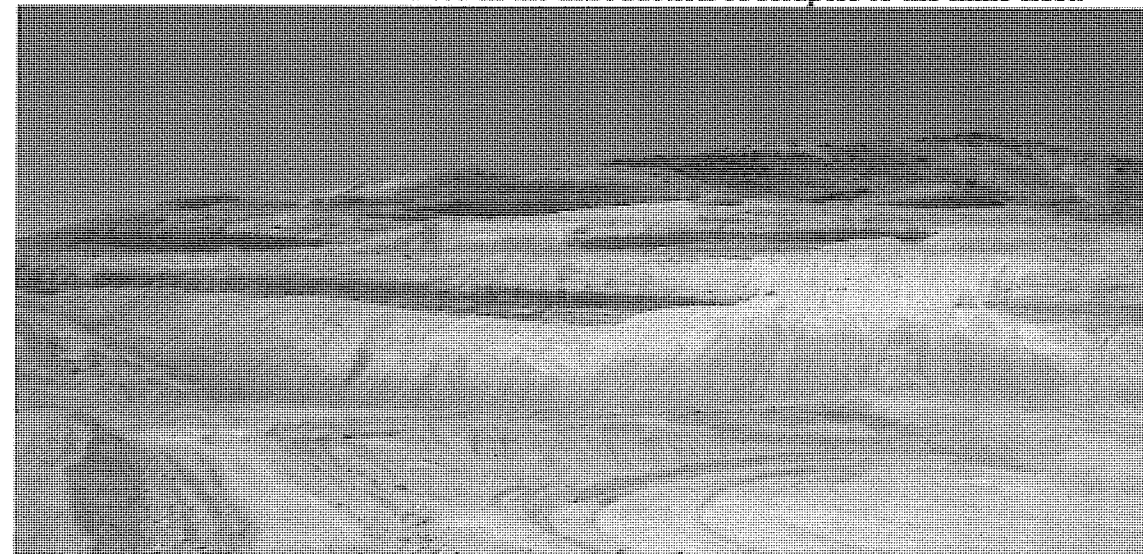


Figure #8. View of the Socorro Mine

Processing at the Socorro plant involves the crushing and sizing of the ore. The ore is first crushed in the quarry and then transported to the plant via conveyor. At the plant the ore is dried in a rotary kiln. Following the drying stage, the ore is screened and further crushed if needed. The finished products are stored in bins. From the bins the ore can be loaded into rail cars or bulk trucks for shipping and can also be put into one ton bulk bags or 50 lbs bags for shipping out by truck.

## **ORE RESERVES**

The perlite dome that Dicaperl has developed at Socorro is one of the premier deposits in the world. In the United States it is surpassed in size only by the No Agua perlite deposit in northern New Mexico, where Dicaperl owns a companion mine. Proven reserves are adequate well into the middle of the next century.

## **PRODUCT**

The Socorro plant produces only crushed and sized perlite ore. The various ore products that are sold at Socorro are the result of controlled crushing and sizing to specified grades. The coarser grades of perlite ore are typically used as horticultural additives. The medium sizes are typically expanded into aggregate and building products. The finest sizes are most typically used in the filtration market.

Some of the specific end uses of perlite are:

**HORTICULTURE** – soil additive, loosens heavy soils and provides good root base.

**CONSTRUCTION** – acoustical tiles, insulation boards, lightweight plasters and lightweight aggregate.

**FILTERAID** – pharmaceuticals, waste water and other liquids.

**FUNCTIONAL FILLER** – carrier of herbicides, insecticides and chemical fertilizers.

Socorro perlite is shipped all over the United States, Canada, Mexico and overseas.