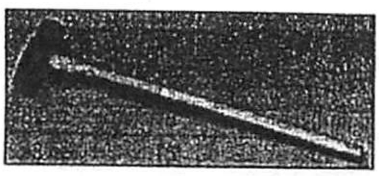
Pipestone

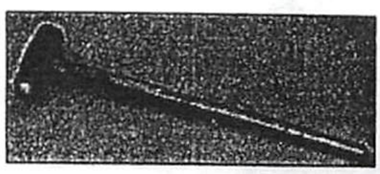
National Monument
Minnesota

National Park Service
U.S. Department of the Interior

Quarrying

The process of quarrying Pipestone (catlinite) for use in carving pipes and other articles is a slow and laborious task. The process requires a vast amount of quarrying knowledge and experience as well as numerous hours of work put in be the individual. In addition to this, a large amount of hand tools such as sledge hammers, pry bars, chisels, wedges, shovels and picks are required as well. These hand tools are the only tools which can be utilized in quarrying because explosives and heavy machinery would shatter the precious stone. Quarrying time may take anywhere from 3 to 6 weeks or even longer depending on the number of quarriers and the depth of the Pipestone. There are several steps involved in excavating the stone, but the hardest and most daunting task involves removing the thick layer of Sioux Quartzite which covers the softer Pipestone.





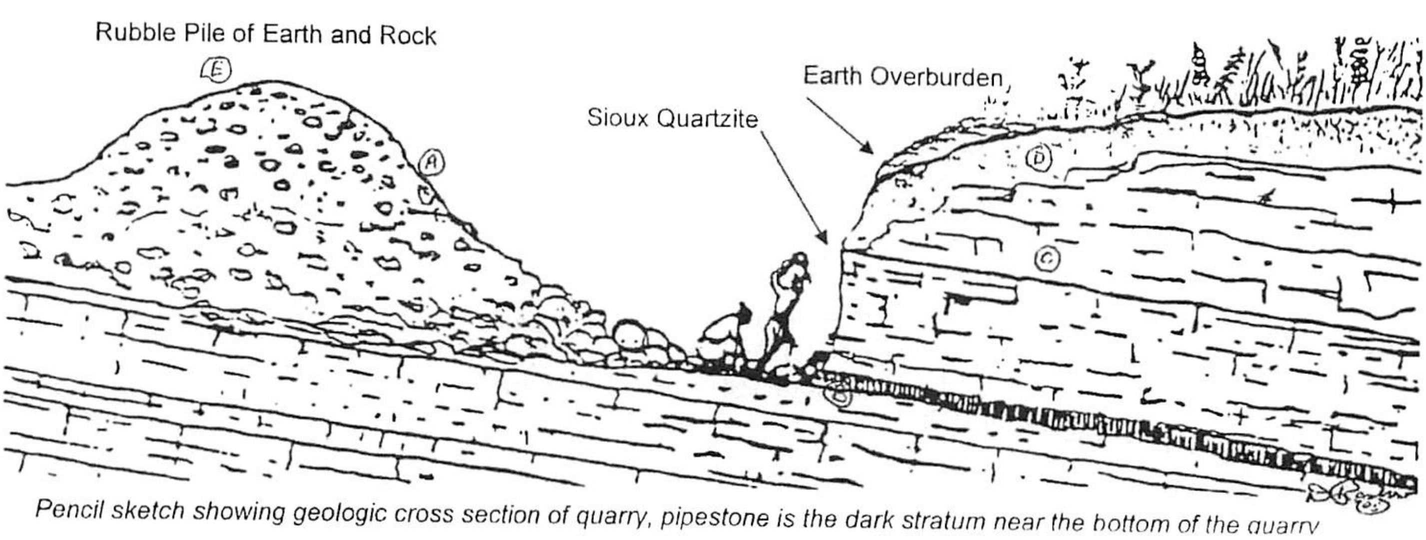
The Quartzite Layer

The Sioux Quartzite consists of several layers with definite fractures and visible cracks where the quarrier will place his or her chisels and wedges. Using sledge hammers, the quarrier drives the wedges into the cracks in the quartzite in order to loosen large chunks of the rock. These pieces are then broken off of the main quarry wall and dropped to the floor of the quarry. Large mauls are then used to break these sizable chunks up into smaller pieces, which can be tossed up and out of the quarry (piles of discarded Quartzite are very visible along all of the quarries in the park). This process is repeated over and over until the Pipestone layer is exposed.

Pipestone Exposed

Once exposed, extreme care must be taken to remove the Pipestone. The pipestone layer is only about 14 to 18 inches thick, but only about 2 inches of that is ideal for carving pipes. The Pipestone, much like the Quartzite, has natural fissures which allow it to be taken out in sheets which are usually 1 to 3 inches thick. Each of the individual Pipestone layers must be meticulously removed one at a time.

A. Quartzite Rubble
B. Pipestone Vein
C. Quartzite
D. Earth
E. Rubble Pile of Earth and Rock



Pencil sketch showing geologic cross section of quarry, pipestone is the dark stratum near the bottom of the quarry

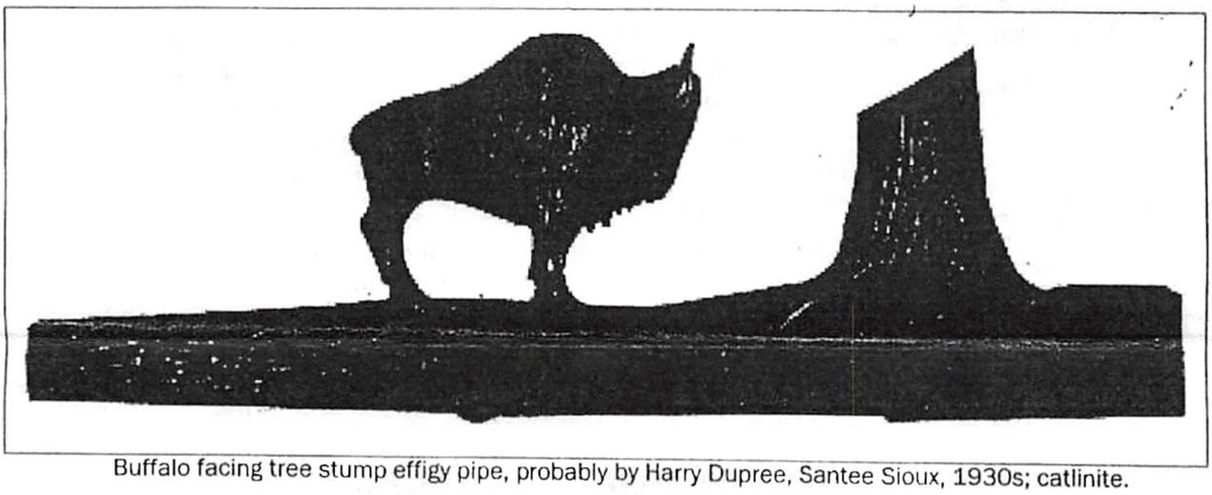
Catlinite

George Catlin

George Catlin, the well-known artist, visited the pipestone quarry late in the summer of 1836. Catlin was not the first white man to visit the quarries, but he was the first person to publicize the area. His paintings and other works of art introduced the activity at the quarries to the rest of the world and it was Catlin who first brought the soft red stone known as Pipestone to the attention of nineteenth century scientists. He sent samples of the stone to a scientist in Boston for analysis. The scientist identified Pipestone as a "new compound" which was named "Catlinite" in honor of the American artist. "Pipestone," however, has remained the name most commonly used.

Is Pipestone Hard or Soft?

Some early writers described Pipestone as being soft when first removed from the quarries and only becoming hard after exposure to the atmosphere. In reality, the stone is very workable even right after it is taken from the ground. Even pieces that have been exposed to the elements for years are still soft and as workable as they were the day they were removed from the ground. Pipestone is often compared to commercial soapstone, which is also a soft stone. Pipestone is a clay which is slightly harder than soapstone and can easily be cut with a steel knife. For means of comparison, Pipestone is approximately the same hardness as the human fingernail.



Buffalo facing tree stump effigy pipe, probably by Harry Dupree, Santee Sioux, 1930s; catlinite.

Chemical Analysis of Pipestone

<u>Table 1</u>: Dr. Jackson's chemical analysis of the Pipestone sample brought by George Catlin (1836).

Water	8.4
Silica	48.2
Alumina	28.2
Magnesia	6.0
Carbonate of lime	2.6
Peroxide of iron	5.0
Oxide of Manganese	0.6
Loss (probably magnesia)	1.0
Total:	100.0

<u>Table 2</u>: Blood red catlinite sample analyzed by Dr. Ellestad at the University of Minnesota (1938).

Silica (SiO_2)	49.01
Alumina (Al_2O_3)	35.17
Ferric Oxide (Fe_2O_3)	3.06
Magnesia (MgO)	0.23
Calcium Oxide (CaO)	0.05
Soda (Na_2O)	0.06
Potash (K_2O)	5.62
H_2O	5.87
Titanium dioxide (TiO_2)	0.44
Lithium oxide (Li_2O)	0.16
Ignition, less total H_2O	0.24
Total:	99.91