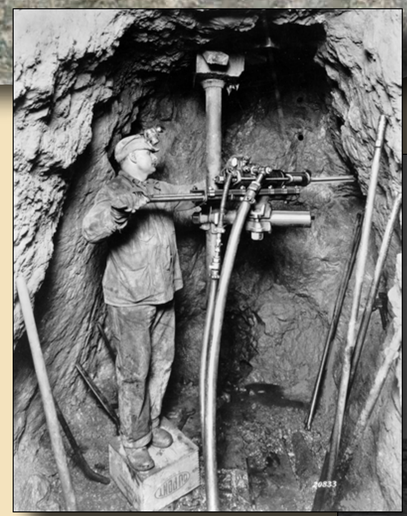
The Boulder Batholith and the Richest Hill on Earth

The Boulder Batholith originated as part of the Elkhorn Mountains Volcanics. Molten magma rose up through the earth's crust from 81 to about 74 million years ago. When it reached the surface, the magma created violent explosions that hurled chunks of rock, cinders, and volcanic ash into the air. The volcanic field was enormous–about 100 miles in diameter and up to 3 miles thick. After the pile of volcanic rocks got too thick, magma stopped going all the way to the surface and accumulated near the bottom of the pile. So much magma intruded at this level that when it cooled it formed a body of granitic rock, called a batholith.

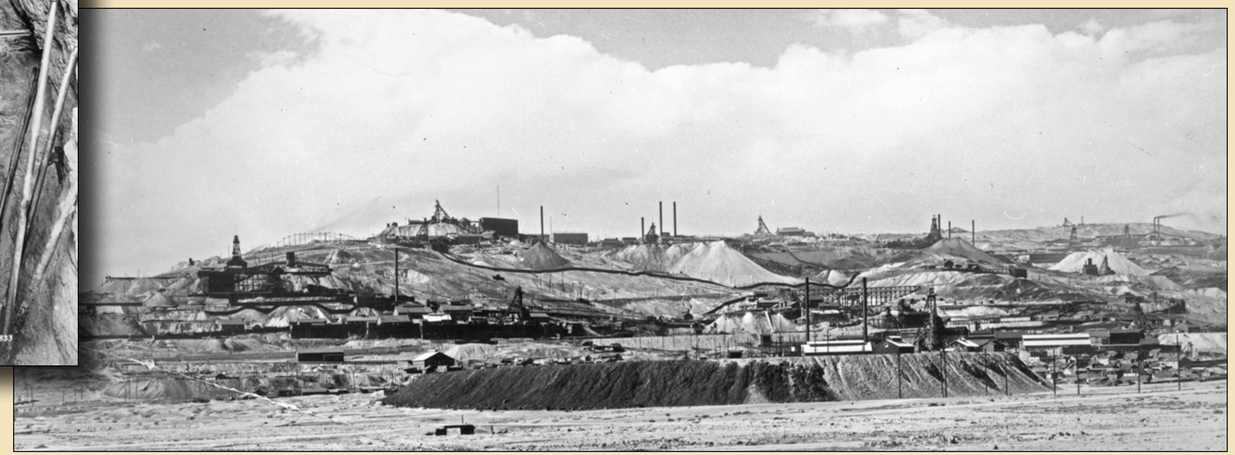
Granite similar to that exposed along Interstate Highway 15 north and east of Butte is the host rock for the ores mined at Butte. This granite formed by slow cooling of molten rock deep below the earth's surface about 76 million years ago. Faults and fractures in the Butte area later cut the granite, forming pathways for hot water that carried metals in solution. As these solutions reacted with the enclosing granite they cooled and deposited quartz and metallic minerals to form veins. Some of these veins were of tremendous size: up to 50 feet wide and 4,500 long. The discovery of copper-rich veins together with the need for copper wire for electrical use from 1880 on stimulated both the development of many underground mines and the city of Butte. From a few dozen gold prospectors in 1864, Butte went to a reported population of 91,000 in 1917. The head frames of some of the former underground shaft mines can be seen piercing the skyline above the tan rock exposed on the sides of the Berkeley pit. Open-pit mining began there in 1955 and continued until mid-1982. Currently copper and molybdenum ore are mined in the Continental pit, which is hidden by the hills just west of the Interstate Highway.



"I Have Struck It." [Jerry Robinson] 1897

Photograph by Dan Dutro

Montana Historical Society Research Center Photograph Archives, Helena, MT



Copper Mines, ACM (Anaconda Copper Mining Co.) Butte, Montana. Meaderville side of Butte Hill. Butte Mines Looking West.

Photograph by ACM Co. Photo Dept., Anaconda, Montana

Montana Historical Society Research Center Photograph Archives, Helena, MT

Geo-Facts:

- The total extent of the underground workings in the Butte district is estimated to be 10,000 miles. There were 74 mines in the Butte district more than 1,000 feet deep.
- The total amount of copper recovered from Butte ore is enough to put a 4-inch-thick layer of pavement on all traffic lanes on Interstate 15 from Butte to more than 30 miles south of Salt Lake City, Utah - a distance of 450 miles.
- In addition to copper, mining operations have recovered significant amounts of zinc, manganese, lead, molybdenum, silver and gold from Butte ore.

Geo-Activity:

- Think back to the last time you broke a ceramic mug, bowl, or vase. The way you might have repaired it is similar to the way veins of metals formed in the Boulder batholith. The ceramic pieces are like the granite which formed from magma and cooled under the earth's surface. Movement in the earth created cracks in the granite, similar to the way your mug or bowl broke into pieces as well. The glue mimics the way hot water with minerals ran through cracks in the granite, leaving veins of metals, like copper.

The Boulder Batholith. Darker-colored granitic rock are in the darker areas.