

## An Overview of Stamp Mills of the California Desert.

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The Mojave Desert Heritage and Cultural Association's two historic stamp mills, situated at Goffs, California are the only operational stamp mills situated within the California Desert. The American Boy first saw service in 1887 in Montana, the Stotts, which was located about 20 miles northwest of Goffs, probably dates from the early 1900s.

The stamp mill is now an obsolete technology, akin to the steam locomotive, however at one time nearly every significant historic mine throughout the west had a stamp mill associated with it. The stamp mill was used to pulverize crushed ore to a powder prior to extracting valuable metals.

A stamp mill essentially is an oversized mechanical mortar and pestle. Powered by water, steam, electricity or an internal combustion engine, the pestle, or stamp, is lifted by a cam fixed to a rotating shaft, then dropped repeatedly onto a steel shoe in a mortar box. Water is added to the mix of crushed rock in the mortar box and a screen on the front which only allows ore pulverized to a small enough size to pass through.



Wood cut from De Re Metallica showing a stamp mill

This technology is ancient dating to as early as the third century B. C. Stamp mills were used throughout the Roman Empire. Also, they were used in the medieval Islamic world as well as throughout Europe during this time. Water-powered stamp mills are illustrated in Georg Agricola's *De Re Metallica* published in 1556. The first stamp mill in the United States was built in 1829 at the Capps mine near Charlotte, North Carolina.

Until the 1970s, when heap-leaching began to be used on low-grade gold ore, milling of ore principally involved four steps: 1) crush ore to a size small enough to be fed into the pulverizer 2) pulverize the ore 3) concentrate the ore 4) refine the metal.

Historically throughout California, the first step of concentrating gold ore was a simple amalgamation process. Pulverized rock in a slurry passed from the mortar box over a gently slanting copper plate, which was typically electro-plated with silver. These plates were then coated with mercury. Gold would adhere (amalgamate) with the mercury. Periodically the stamp mill would be shut down and the amalgam would be scraped from the copper plate. The amalgam would then be processed in a retort where the mercury would vaporize and was recovered, leaving the gold behind for final refining. Both of the restored MDHCA stamp mills are fitted with sluice tables where the copper plate would have been. The sluice table has riffles like its cousin the sluice box which is used extensively in placer gold recovery.

After passing over the copper plate, the slurry was usually sent to a shaker table, which concentrates heavy minerals in a gravity process not unlike a gold pan. Depending on the amount of "free gold" in the ore, this process would recover about 70 percent of the assayed value of the ore. Gold ore combined with sulfide minerals, such as pyrite, typically will not amalgamate requiring much more expensive alternatives.

During the 1890s the cyanide process was developed bypassing the need for amalgamation. In this process, the slurry is combined in a weak cyanide solution. Gold dissolves in the cyanide solution, then the precious metal is recovered from the solution.

### **Large Stamp Mills of the California Desert**

We won't go into all the variations in mills here, but one variation is worth mentioning.

The Mining and Scientific Press on April 7, 1894, published an article about two 10-stamp mills erected at the gold camp of Vanderbilt located 30 miles north of Goffs and about 15 miles from Interstate 15. This article contrasted the two mills operating here. One was referred to as a Colorado stamp mill; the other, a California stamp mill. The stamps in the Colorado mill dropped twice as far and half as fast as the California mill.

The stamps at the Vanderbilt Mining and Milling Company's "Colorado mill" weighed 650 pounds each and dropped 16 inches 30 times per minute. At the "California mill," erected by Alan Green Campbell, the 750-pound stamps dropped seven inches 90 times per minute. The article summarized that, when used on the same ore, the mills are essentially equivalent and that "both are good."

Both small and large stamp mills were used throughout the deserts of California. The largest mills include the following: the Tumco (Hedges) Mine located in Imperial County, supported two mills which totaled 140 stamps, the 50-stamp Randsburg-Santa Fe Reduction Company Mill, later renamed the Bagdad Chase Mill, was located in Barstow, at Daggett the 60-stamp Waterloo Mining Company mill,

and other smaller mills processed silver ore from the mines at Calico, the Yellow Aster Mine in Randsburg supported an 100-stamp mill, the Lucky Baldwin Mine, also known as the Gold Mountain Mine, located northeast of Big Bear had a 40 stamp mill.

### **Mojave Desert Heritage and Cultural Association Stamp Mills**

A handful of mills remain in place within the California desert and its fringes. A 10-stamp mill remains at Skidoo in Death Valley. The Wall Street 2-stamp mill erected by William Keyes can be found within Joshua Tree National Park. Also, within Joshua Tree National Park there is 10-stamp mill at the Lost Horse Mine. Just outside of the California Desert in Keyesville, Kern County there is a 10-stamp mill and a 5-stamp mill can be found high in the Inyo Mountains at Beveridge.

Currently there are two refurbished operational stamp mills at the Mojave Desert Historic and Cultural Association museum at Goffs, California: the 10-stamp American Boy Mill and the 2-stamp Stotts Mill.

In the mid-1970s while conducting field work, Bureau of Land Management staff stumbled on an intact 2-stamp mill located at the south end of Round Valley, about 20 miles northwest of Goffs. BLM manager Wess Chambers mentioned the mill to Dennis Casebier, and years later, in February 1999, Dennis and Chris Ervin went searching and found it. The Mojave Desert Heritage and Cultural Association was founded by Dennis Casebier in 1993.

Little is known about the mill. Between 1908 and 1910 there was mining activity just to the south in Gold Valley. During this time a mill was erected in the vicinity but the location is not known; perhaps this is the mill that was mentioned. On August 14, 1931, the property that embraced the mill was patented by Ambrose Stotts under the Stock-Raising Homestead Act.



1975 Photo of the Stotts mill, Round Valley, BLM Photo

The mill was purchased from the land owner Bud Smith III. By September 1999, MDHCA volunteers began disassembling and hauling the mill to Goffs. Reconstruction began a year later and continued until 2003. After a hiatus, work resumed in earnest in 2008. The project was much more than reassembling a jigsaw puzzle. The mill needed a new power source. A new bull wheel had to be fabricated as did bearings and a cam shaft. A cam had to be repaired. It was finally operational March 28, 2010.

Approximately 2,460 hours of volunteer labor was expended on this project. The mill is powered by a 10-horsepower electric motor; it has an automatic feeder that delivers crushed rock to the mortar box.

The history of the 10-stamp America Boy Mill is nothing short of amazing. The mill is a portion of the 60-stamp mill erected in 1887 at the Empire Mine, Montana. The mine was located on the west slope of Mount Belmont, about 2 miles west of Marysville and about 20 miles north of Helena, Montana. In 1928, 10 of the 60 stamps were moved to the Jay Gould mine. The mill was located about 1,100 feet south of the mine at 46°52'45.93"N 112°27'28.07"W



Location of the Jay Gould Mine and Millsite  
Twenty-eight miles northwest of Helena, Montana  
1924 General Land Office Survey of T13N, R7W

Sometime in the 1950s Glenn Allman acquired the mill to serve his American Boy mine, and moved it about a mile to the northwest, to the south side of Stemple Pass. Allman refurbished the mill; however, the mine failed to yield a profit. The mill structure still stands in Stemple Pass at 46°53'42.99"N 112°28'10.03"W.

The mill was then purchased by Joe Pauley of Rosamond, California. He had hoped to sell the mill to Walt Disney when Euro Disney was under construction in Paris, France, but deal didn't go through. In 1996, Dennis Casebier purchased the mill from Pauley. Restoration began in October 2010 and was completed three years later after an estimated 4,100 hours of volunteer labor. The mill is powered by a 30-horsepower diesel engine; it has automatic feeders that deliver crushed rock to the mortar box.

Both mills were refurbished under the direction of Charlie Cornell. Restoration of these mills was a herculean effort that involved many individuals and generous financial donations.



Restored American Boy Stamp Mill  
Photo by Larry Vredenburgh



Restored Stotts Mill  
Photo by Larry Vredenburgh

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