The Wolverton Mill

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In the early 1900's, Edwin Thatcher Wolverton, a mining engineer from Maine, came to southern Utah to look for gold in the Henry Mountains. Believing he had discovered the location of a legendary Old Spanish Gold Mine, Wolverton tried for nearly 12 frustrating years to file mining claims around Straight Creek on Mt. Pennell only to find each time that others had filed before him. He waited until the others gave up and, about 1915, was finally able to establish his own claims. With the help of his two sons, Norville and Thatcher, the sixty-year-old Wolverton began construction of a mill to crush gold ore about 1921. Knowing that he would need wood for the mine as well as some way of keeping in supplies, Wolverton built a large table saw in one end of his mill. With this, he could cut lumber for his needs as well as those of many of his remotely located neighbors, thereby obtaining supplies and bartered services. This feature made the Wolverton Mill unique because it combined both wood cutting and ore crushing operations under one roof. Besides being unique in function, the Wolverton Mill was also unique in construction. Most log structures of the time made use of some form of log notching and overlapping to tie the walls together. Wolverton cut his logs off evenly, stacked them, and used steel spikes inserted vertically through the ends of the logs to build the mill walls. The walls were built in sections and braced with heavy posts. There were no other mills in the Southwest like this one.

Gold ore was run through the mill for only a short time. It is unlikely that Wolverton ever found his lost mine, but, once in a while, he would show up in town with a little gold. Irregardless of whether Wolverton's dreams were realized, his mill stands as a unique monument to mining, perseverance, and genius. In 1929, E. T. Wolverton died at the age of 67. His grave in the Elgin cemetery near Green River, Utah, is marked by a granite arrastra drag stone his sons brought from the Henry Mountain mill.

When the mill still stood on Mt. Pennell, it was subjected to vandalism and was the source of a variety of problems. Because of this, the Bureau of Land Management moved the mill to its present location in Hanksville during the summer of 1974. Restoration of the mill was completed in 1988.

Self-Guided Tour

The order in which the various mill components are discussed below does not correspond to the order in which you will observe them as you move through the mill. This writeup follows the flow of energy from the wheel to the other workings in the mill, the order in which they were built, and their place in the ore-crushing process. Figure 1 shows a general view from above and identifies the mill's different components.

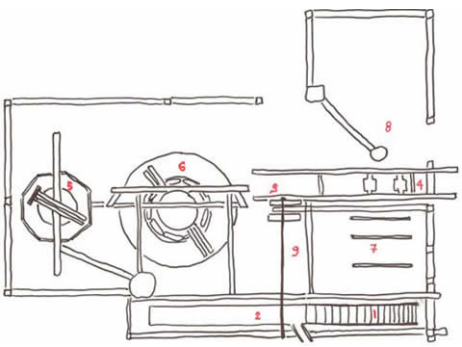

Figure 1. General Layout of Wolverton's Mill: (1) waterwheel; (2) water control system; (3) pulleys; (4) pulley; (5) primary ore crusher; (6) arrastra; (7) lathe; (8) workshop; and (9) ladders.

1. The Waterwheel

The focal point of the mill, and Wolverton's engineering genius, is the large overshot water wheel that powered the ore crusher, arrastra, and saw. The overshot wheel, so named because it is powered by water flowing over its

top, provided the best power efficiency of the vertical wheels. It was probably the only type that would power Wolverton's combination of needs. The wheel is entirely original, and is made of "sappy" or resin-loaded wood as it was known to resist rot, warping, and insects. Once soaked with water, the wooden parts of the wheel would tighten up and become essentially watertight. Visitors used to come to the mill to see the 20-foot waterwheel in motion. Although the flume carrying water to the mill from Straight Creek collapsed years ago, the perfectly balanced wheel could still be turned by hand.

The waterwheel was completely enclosed at the original site, probably to keep mud and ice from forming on it when idle, but has been left open here so it can be seen (see Photograph 1). At the north end of the wheel there was once a small area enclosed by wood and canvas that served as a cool box for Wolverton's perishable foods. Wolverton needed to have the flat boards for his water wheel and flume cut by someone else. Until he could assemble his own wheel, he was without the power to cut his own lumber. The evidence for this can be seen in the curved saw marks on the wheel's bucket timbers. The flume timbers, too rotten to be used in reconstruction, bore similar marks. Wolverton's own straight vertical saw was operational only after the waterwheel was operational.

Photograph 1. The waterwheel on the relocated Wolverton Mill in Hanksville, Utah.

2. Water Control System

The heart of this system is the flume that carried water to the mill from a diversion point still evident today on Straight Creek some distance upstream from the original mill site. Using simple gravity feed, a lengthy system of flume boxes carried water down slope and, eventually, out and over the top of the mill wheel which was set considerably lower than the diversion point. This drop allowed the water to build up enough speed to power the wheel and other components inside the mill. Similar to turning the power on and off, Wolverton needed a way to occasionally stop the wheel and shut things down. This he accomplished through a system of levers that allowed him to raise and lower a butterfly gate in one end of the flume thereby controlling the flow of water to the wheel. When the butterfly gate was raised, the water flowed over the top of the wheel; when the gate was lowered, the water was diverted out the side of the flume before it reached the wheel.

3. Pulleys & Belts

The system of pulleys and belts transferred the power from the main drive wheels to the ore crusher, arrastra, and saw. The long belt to the ore crusher was in place permanently (see Photograph 2). The shorter belt operated both the arrastra and saw and was transferred between the two as the occasion required. A series of ropes attached to the various hinged pulleys could be tightened to increase the friction against the drive belts if more power was needed.

Photograph 2. Conveyor belt used to drive the ore crusher.

4. The Saw

The saw was probably the first mechanism powered by the waterwheel to be constructed as Wolverton needed to be supplied with wood to build other parts of the mill, mine braces, etc. The straight saw marks left by this saw can be seen on some of the original timbers used in the ore crushers. The saw consisted of a straight 60-inch saw blade set vertically between a set of sliding wooden arms. These arms were powered by a bent shaft set in a 12-inch diameter wooden roller which was belt-driven by the large main drive wheel. This action gave the saw blade a 23-inch vertical jigsaw type stroke. Logs were fed into the saw over a roller-equipped saw table. The grooves worn into the saw table by the rollers are visible. This table originally extended out the door about five feet further than it does now.

5. The Primary Ore Crusher

The first stage of the ore crushing process consisted of the octagonal primary ore crusher. Here, large chunks of ore-bearing rock from the mine were reduced to gravel by this heavy steel wheel as it traveled around its track (this track may have originally been surfaced with metal or granite to provide a hard grinding surface). A metal guide was mounted to the wheel's crossbeam so that the guide always stayed just in front of the wheel continually scraping ore into the wheel's path (see Photograph 3). The crusher was driven by the smaller secondary drive wheel.

Photograph 3. The ore crusher at Wolverton Mill used a heavy steel wheel.

Most of the metal mechanisms in the mill, and possibly the pulley wheels, came from the once thriving community of Sego, Utah, now a ghost town located about 30 miles east of Green River.

6. The Arrastra

The arrastra (a Spanish invention and name) marked the second and final stage of the ore-crushing process. It was essentially a watertight wooden tub set on a bed of 4x4 inch pine braces. Ore from the primary crusher was loaded into this granite-lined tub where it was ground to a powder by two large granite drag stones suspended from the ends of the traveling crossbeam (see Photograph 4). During this process, water was fed into the tub from the flume to help lift out and drain off unwanted material.

Photograph 4. The arrastra was used to grind the ore to a powder.

7. The Lathe

An early diagram of the mill refers to a "turning lathe" in the ample space next to the saw pulley. However, no remains of a lathe were found when the mill was moved from Mt. Pennell, nor does Wolverton's diary mention one. It is doubtful that the lathe was ever completed, and the example here shows only where it would have been located.

8. The Workshop

Wolverton no doubt spent a good deal of time in this room, much of it divided between his workbench and forge. Here he apparently did some of his own blacksmithing and perhaps some writing. As he was by himself much of the time, Wolverton wrote many times to his wife describing his feelings and conditions on the mountain. He also kept a detailed diary describing, among other things, the daily weather and the mice in his cabin at night. He drew up a lot of plans for the mill, some showing items never found.

Perhaps some of these were never completed, perhaps he changed his mind, or a few items may have found other homes during the mill's early years on the mountain. The display case, which has replaced the original workbench, contains some of the items that were found relating to the early operation of the mill.

There was once a wall between the large, free-standing ponderosa post near the door and the one opposite in the corner nearest the display case which probably made the original workshop fairly comfortable. This wall has been left out of the reconstructed mill to provide for visibility and movement. In the original mountain structure, these two large posts, as well as the tall one in the east wall at the south end of the wheel, were actually live trees with the mill built around them. The granite floor in this room was provided for safety and maintenance needs. The floor in Wolverton's time was uneven dirt.

9. Ladders

Wolverton placed crude ladders like these throughout the mill so he could work on the flume, waterwheel, drive wheels, and pulleys.