

Blast Design at Pinson Mine

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Abstract

The Pinson Mine has several different rock formations, running throughout the pits. The main types of material found are Alluvium, Shale and Limestone. In some instances, all three can be found within one blast pattern. Several areas have broken material, which makes it very hard to drill and to shoot. If not timed and loaded correctly a lot of the explosive energy is lost through the broken material.

Their drill patterns were based on 12 - foot spacing with a 12 - foot burden. For ore control purposes, their bench height is 20 - feet with a 3 - 4 foot sub drill. The hole diameter is a 6 $\frac{3}{4}$ inches. With a 12' X 12' pattern, it was difficult to raise the powder column up enough to effectively break the rock while still keeping the ore zone intact. While all areas had their problems, the most problematic area was in the Limestone. The Limestone areas were very hard to dig, having very tight muck piles and excessive oversized material throughout the muck pile. Most of the oversized material was found towards the top of the muck pile, which I attributed to not having enough explosive column rise within the blast hole. I also believed that the timing of the patterns was too fast and did not create enough relief to move the material being shot.

After consulting with Pinson, it was determined that with the use of infill holes for sample collection, in critical ore zone areas, it would be possible to expand blast patterns to a 15' X 15' pattern. Expanding the patterns would allow me to raise the powder column to an 11 - 12 foot stem, or 160 pounds per hole. Initial testing showed that it would actually take a minimum of 176 pounds to reach the 11 - 12 foot stem. This was due to the drill holes not holding a 6 $\frac{3}{4}$ inch diameter after being drilled.

Examining the muck pile after our first blast of 15' X 15' pattern showed a drastic reduction of oversized material. The operators said that it was hard digging in some areas. We tightened the next pattern to a 14' X 14' and held the same powder column. The results were excellent for digging purposes but, I thought that there was too much movement for ore control purposes. I reduced the next pattern by 16 pounds per hole. The back break and movement was reduced but there were still complaints of hard digging. I decided to return to the original powder column of 160 pounds but reduced the powder column to 100 - 120 pounds along the last two-parameter rows of the pattern.

The back break and movement was reduced while still maintaining a diggable face.

Many items other than the powder columns affected these studies. I believe that the timing of the blast patterns also played a great role in the results of the blast patterns. I will expand in much detail the effort, experiments and results by all those involved once my final paper is completed.