

THE AUSTIN ADVANTAGE

REDUCING NO_x WHILE
MAINTAINING EXCELLENT
FRAGMENTATION AND
DIGGABILITY IN LARGE
IRON ORE MINE



GENERAL INFORMATION

Location: Austin Powder Mining LLC, Hibbing, Northern Minnesota, USA

Project Type: Open-pit surface mine

Industry: Iron Ore

Products Used: Hydromite 4500 (a gassed blend of 75% Hydrox 505 and 25% AN prill)

Project Lead: Bill Thronson, Sales Manager; Regan Scuffy, Location Manager; Ron Duncan, Bulk Systems Manager

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THE HISTORY

Austin Powder Mining LLC has been a steadfast supporter of iron ore production in Northern Minnesota for many years. The AP Mining team has built solid relationships with their customers due, in part, to their strong work ethic and willingness to meet the high demand of the mines in the Iron Range. In Hibbing, all levels of the AP Mining team help support their customers every day.

This project aimed to provide an explosives solution that would decrease the amount of NO_x produced post-blast while maintaining the excellent fragmentation and muckpile shape that AP Mining's customer has come to expect from Austin Powder. The team set out to find a solution to the post-blast fume concerns while still providing first-class, diggable material in both the open pit's ore and waste zones.

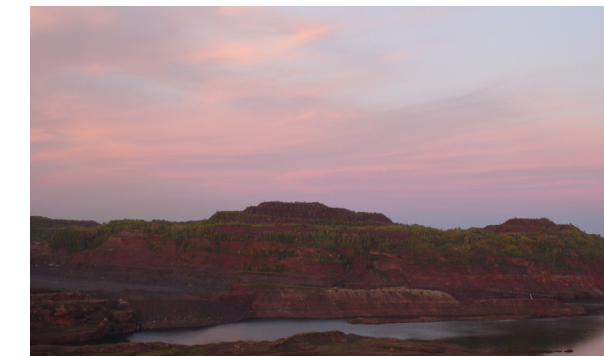
THE GOALS

1. Provide an explosives solution that would decrease the amount of NO_x produced post-blast
2. Maintain the excellent fragmentation and muckpile shape that AP Mining's customer has come to expect from Austin Powder
3. Maintain first class, diggable material in both ore and waste zones of the open pit



CUSTOMER CHALLENGE

- Iron ore deposits are incredibly dense, compact, and difficult to fracture. Here, lots of explosive energy is needed to facilitate rock breakage.
- The fume problem in the waste zones was that the high VOD emulsion blend was overshooting the sandstone and producing NOx; however, this high explosive energy produces favorable results in the hard, dense ore.
- The customer would like to have one bulk product used at their site. The challenge was to find a solution that meets all criteria for blasting success, such as fragmentation, diggability, and muckpile shape, while decreasing the amount of hazardous fumes produced.
- The drill patterns at this mine are enormous and consist of 16” diameter boreholes. With a 40’+ solid column of bulk explosives, each borehole holds more than 2,000 lbs, loaded by a bulk truck at 1200 lb/min. To this point, Austin Powder had never loaded gassed emulsion that quickly or in a borehole that large in diameter. Before testing could begin, the project team had to engineer solutions to provide high-quality gassed emulsion in an environment where Austin Powder had not gassed before.



THE AUSTIN SOLUTION

To provide a reduction in noxious post-blast fumes, Austin Powder created a plan to implement a bulk explosive with a decreased velocity of detonation to reduce the amount of NOx fumes generated during the loss of confinement. By working with the customer, a test plan was developed to trial a chemically sensitized emulsion blend. A plan was accepted, and Austin Powder worked for over a year to engineer, design, and build the equipment needed to meet the requirements of the rugged mining environment in the iron range.

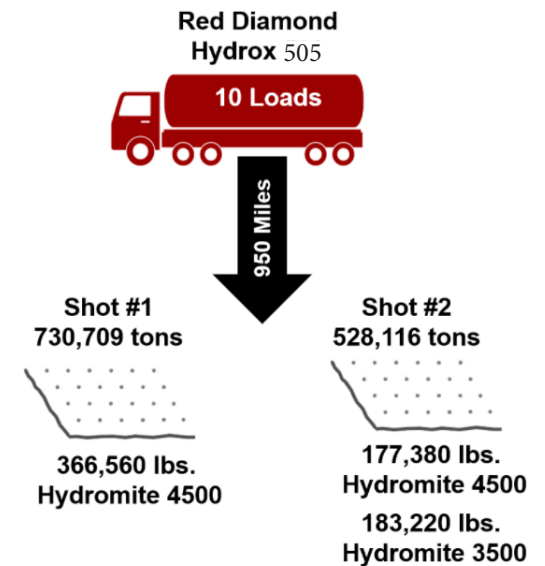
The Bulk Systems Group, along with their contractors and vendors, developed a retrofit package that would upgrade the control systems and allow the gassed emulsion to be produced by the existing Hibbing bulk fleet. Through this process, the group worked with many equipment and hardware suppliers, and software developers, to build a custom solution that would successfully bring Austin Powder’s gassed emulsion to the Iron Range.

THE **AUSTIN** SOLUTION - CONTINUED

The plan included:

- A gassing system for our quad pump trucks that allowed us to gas a blended product of 75% emulsion and 25% prill at a pumping rate of 1200 lbs. per minute.
- Two trucks were converted for this initial trial; one was converted at the Hibbing location, and one at the bulk equipment garage in West Virginia.
- A third truck was sent out to West Virginia for conversion. Ultimately, Hibbing will have all eight trucks converted to gassing capabilities.
- The local Hibbing team developed a gassing agent transport trailer to bring enough gassing agents to the mine for the bulk trucks to refill and continue loading the huge patterns.
- As Hibbing typically produces microballoon sensitized emulsion, the plant is configured slightly different than Austin Powder's bulk plants that produce Hydrox emulsion for gassing. This being the case, the gassed emulsion trial would require emulsion to be brought from Red Diamond in Southeast Ohio, almost 1000 miles away!

Iron Range Gassing Trial



THE **OUTCOME**

For the trial, the transportation and logistics team at Red Diamond, and the team at the bulk plant, were able to send ten tankers (totaling more than 400,000 lbs of Hydrox emulsion) to Hibbing with only a slight impact on their day-to-day production and delivery requirements.

Hibbing operators and mechanics, the bulk equipment manager, three truck experts from the bulk equipment division, the bulk products manager, and the global director of emulsions were all on-site for the trial.

In total, over half a million pounds of Hydromite 4500 were loaded, spanning two days. There were two drill patterns in the fume-producing hard waste rock. This provided an opportunity to see if the gassed emulsion would reduce the amount of NOx produced and to see if this new product would successfully break the rock.

More than 500 gallons of gassing agents were used in the two-day trial.

Ultimately, both patterns were shot on consecutive days. Neither shot produced any NOx, and both provided excellent fragmentation for the customer. The customer was pleased with the results of the test and is looking forward to another trial.

“The success of this trial is directly related to the great teamwork performed within the Austin Family.”

– Bill Thronson



AUSTIN POWDER