

Project Spotlight

Bull Mountains Mine-Billings, MO

Owner: Signal Peak Energy

Installer: Wright Concrete and Construction Inc.



Background Information

Over the years, longwall mining has become one of the most popular methods for mining coal. It has also developed a reputation for being one of the safest methods for extracting coal. However, this does not mean that longwall mining is without its occupational hazards and operational challenges.

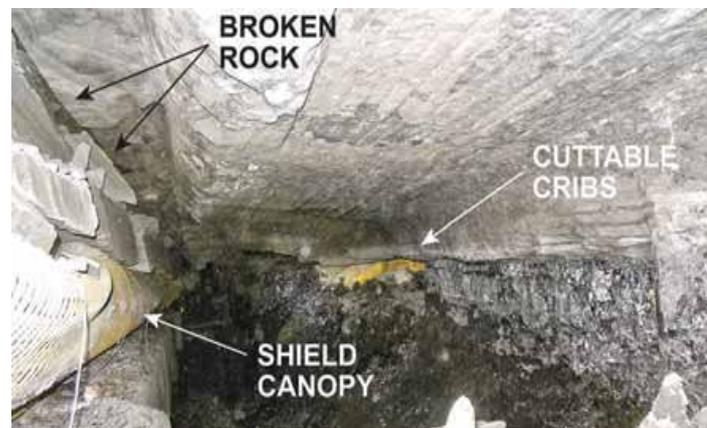
In longwall mining, roof supports are constructed to protect workers and equipment, and as the shearing machine progresses through the coal panel, roof supports are advanced mechanically. One of the most dangerous operations that takes place in longwall mining is called longwall recovery, which is the technique of moving the face once a panel is completed. Longwall recovery is dangerous because it involves the use of heavy equipment in extremely tight spaces and exposes the miners to the gob edge of the mine. To protect the miners during this operation, walking shields, along with cribbing or supplemental standing and roof support, are employed during shield removal.



The Bull Mountains Mine No. 1, located thirty miles north of Billings, Montana, recently completed a historic longwall recovery operation utilizing a non-traditional, predeveloped recovery entry created with low-density cellular concrete. This longwall recovery enabled Signal Peak Energy (the owner of Bull Mountains Mine) to advance the mine's longwall without the need to halt operations and install supplemental roof supports, which are typically necessary in these operations. This was one of the first longwall recovery operations to feature the use of a low-density cellular concrete as a backfill material, and at 42 feet was also one of the largest successful, predeveloped recovery entries in the history of longwall mining (previously, the widest successful recovery entry was 36 feet).

Project Details

This unique recovery entry was created in two construction phases. First, the 21-foot-wide inby section was completed, bolted, and secured with both steel wire mesh and non-metallic recovery mesh. This section was then backfilled using low-density cellular concrete. After the concrete cured completely, the 21-foot-wide outby section of the entry was completed using the same technique. This section was also completely backfilled with low-density cellular concrete.



picture source Longwall Mining Article 2015, featured in WOMP Vol.8

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Project Details Cont.

The backfill application was completed by Wright Concrete and Construction Inc., who chose to use AERLITE-iX™ foam concentrate by Aerix Industries to make low-density cellular concrete (LDCC). Because the floor elevation of the mine dropped from the tailgate side to the headgate side, LDCC was pumped in that direction through surface boreholes. The concrete was pumped at a rate of 800 cubic yards or less for 12-hour periods, followed by 12 hours of initial curing. The concrete density was monitored continuously, and samples of the concrete were taken every hour of application to ensure that it was meeting the project's minimum required unconfined compressive strength of 800 psi. More than 19,000 cubic yards of concrete was used for the entire project.

Once the backfill was complete and the concrete was completely cured, mining operations resumed. The shearer successfully cut through the coal and the concrete, and coal extraction continued in the Bull Mountains Mine.



Aerix Added Value

The construction of recovery entries in coal mines is a challenge for many reasons, not the least of which is the importance of maintaining the safety of jobsite workers. A successful cut-through of a recovery entry is a sign of success, and one of the primary reasons this particular recovery entry was successful was the use of Aerix's AERLITE-iX foam concentrate for use in LDCC.

Aerix's AERLITE-iX provided the low density, high compressive strength, and flexible application needed for this particular type of construction. In addition, the use of LDCC as a backfill product eliminated the need for constructing the supplemental roof supports typically required to ensure stability in longwall recovery operations. With Aerix's AERLITE-iX, the Bull Mountains Mine was able to continue its mining operations smoothly and efficiently while maintaining a safe environment for all of its workers.



Picture Source, Longwall Mining Article 2015, featured in WOMP Vol. 8