Case Study

The information in this case study is reprinted from the American Cyanamid AM-9 technical manual. AM-9 was American Cyanamid’s acrylamide grout product. Avanti’s AV-100 Chemical Grout matches the chemical formulation, usage and performance of AM-9.

Title: Consolidating Weakly Cemented Sandstone During Cross-Cut Construction

Location: Seafield Colliery, Kirkcaldy, Fifeshire, Scotland
Owner: National Coal Board, Scottish Division
Grouting Contractor: Cementation Company Limited

PROBLEM:

At Seafield Colliery, three cross-cuts, 16-17 feet wide by 12-feet high, were being driven horizontally—one cross-cut at the 1,020-foot level and the other two at the 1,800-foot level—through the Millstone Grit series, which contained many weakly cemented and porous sandstones. Initially some injections were attempted, but the weak cement grout could not penetrate the close, graded sandstone.

SOLUTION:

Tests revealed that a chemical grout of low viscosity would be required, therefore it was decided that AM-9 would be the best choice. The main contractor for shaft sinking, tunnel driving, and associated works including grouting was Cementation Company, Limited.

APPLICATION:

Grout holes were drilled from the face around the entire periphery, fanning out slightly, to provide a treated annulus about six feet thick, after excavation. Treatment length was 90 feet for a 60-foot drive, leaving a 30-foot plug if grouted rock ahead of excavation. Holes were grouted in 10-foot stages. Alternate holes around the ring were grouted first, with remaining holes then filled. When a stage was in shale or limestone, it was grouted to refusal at 1500 psi using cement. Sandstones would not accept cement and were grouted with AM-9 at pressures ranging from 450 to 1500 psi. The average AM-9 Chemical Grout take was half a gallon per cubic foot of rock. Following completion of the first stage grouting, a second stage was carried out in the same fashion.

The process was continuous in all three cross-cuts between the following limits measured from the pit bottom: (a) 1,020-foot level between 6,106 feet and 6,508 feet; (b) 1,800-foot level between 7,677 feet and 8,533 feet.

RESULTS:

It was estimated that the total water make, on average, was reduced by at least 90%.