

NIOSH Releases New Coal Mine Roof Rating Software

Introduction

The Coal Mine Roof Rating (CMRR) is a roof classification system. It was first introduced to the mining community in 1994. The CMRR filled a longstanding need to quantify geologic description of coal measure rocks into an engineering value that could be used for mine design. It has now been written to a user-friendly visual basic code that can be run on any PC with a Windows operating system.

Background

Rocks that form the roof of coal mines can vary widely and quickly in composition, extent, and defects. This results in an equally broad range of rock properties that can substantially affect the ability of the rock mass to form a stable mine roof. The CMRR was designed to evaluate the properties of the coal mine roof rock mass that contribute to its weakness and convert them into a relative strength rating from 0 to 100. These properties include the cohesion and frequency of discontinuities like bedding, slips, shears, and joints; uniaxial compressive strength (UCS); and moisture sensitivity. With simple lab and field tests and observation, the CMRR can be calculated by technical and operating personnel with a minimum of training.

The CMRR has been widely accepted in both U.S. and international coalfields. As a result, a number of roof control applications have been found for the CMRR. It is currently used as an input component in the Analysis of Longwall Pillar Stability (ALPS) program, which is used to design longwall chain pillars. It can be used as a criterion for determining the appropriate width of mine entries. It has also been used to indicate the appropriate length of cut in weak ground. The CMRR can be used as a strength parameter to characterize interburden between mined seams in the numerical modeling of subsidence effects. In any area where an estimation of coal measure rock mass strength is required, the CMRR can be adapted to fill this need.

How It Works

Originally designed to be used with underground exposures, the CMRR can also be calculated from core. The chisel test for bedding cohesion and the ballpeen hammer test for UCS are inappropriate for core. These tests have been replaced by point load testing both axially and diametrically. Two other measures that are common to standard core logging—Rock Quality Designation (RQD) and fracture spacing—are also used to estimate rock weakness. With these easily obtained parameters, the CMRR can be calculated from core and used in the mine planning and exploration phase.

The input screens allow calculation of the CMRR for both underground exposure and core. The CMRR is reported both as a "dry" value and as a groundwater-adjusted value for moisture-sensitive rocks. There is a graphical output report featuring a lithologic column with annotated unit ratings and a roof bolt symbol representing the height of the bolted horizon. Another important feature is an AutoCAD interface. This feature allows the export of located CMRR data directly to an AutoCAD layer in XYZ form. In this way, drill hole data can be inserted directly to a base map.

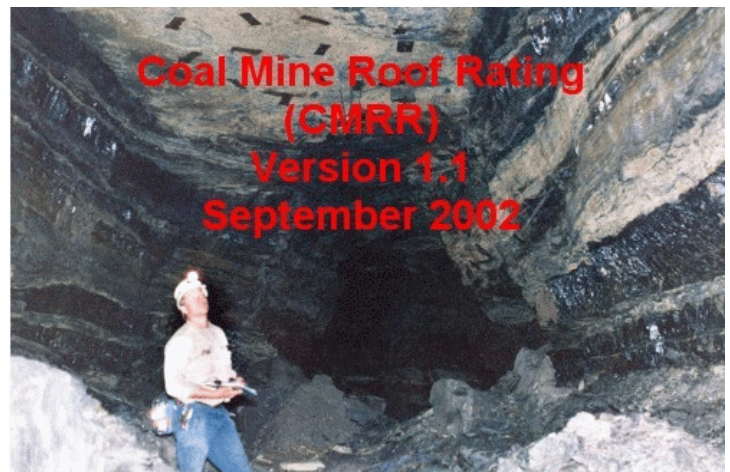


Figure 1.—A strata control engineer collects data for the CMRR.

For More Information

To order a free disk containing the CMRR software, along with all of the other NIOSH ground control software (ALPS, ARMPS, STOP, SHIELD, TGRSS, ARBS, AHSEM, DUCS, and LAMODEL), contact Donna Opfer at (412) 386-6564, e-mail: dopfer@cdc.gov. Or you may complete the order form below, detach, and mail to: Donna Opfer, NIOSH Pittsburgh Research Laboratory, Cochran Mill Rd., P.O. Box 18070, Pittsburgh, PA 15236-0070, or fax to (412) 386-6891.

To receive more information about occupational safety and health problems, call **1-800-35-NIOSH (1-800-356-4674)**, or visit the NIOSH Web site at www.cdc.gov/niosh

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The screenshot shows a software window titled "Parameters" with a "Location Management" section at the top left containing a "Current Location" field with the value "1" and a "Clear" button. To the right is a "Coal Mine Roof Rating (CMRR)" section with "CMRR" set to 63 and "GW Adj CMRR" set to 61. The main area is divided into three tabs: "General", "Unit Description", and "CMRR". The "Unit Description" tab is active, displaying a table with the following data:

Unit Number	Thickness (ft)	Rock Type (Ferm No.)	Unit Rating	GW Adjust Unit Rating	Depth (ft)
Unit 3	10	GRAY CROSSBEDDED SANDSTONE (541)	70	70	987.0
Unit 2	1	COAL	42	42	997.0
Unit 1	2	BLACK LAYERED SHALE (112)	44	44	998.0

Below the table, there is a "13.00" value and a red instruction: "Click on the button 'Unit 1' to enter parameters for Unit 1." At the bottom of the window are buttons for "Copy Form Image", "Plot Roof Layers", "Help", "Cancel", and "OK".

Figure 2.—Data screen with calculated CMRR values

Please send me a free disk that contains the Coal Mine Roof Rating software, along with the other NIOSH ground control software (ALPS, ARMPS, STOP, SHIELD, TGRSS, ARBS, AHSEM, DUCS, LAMODEL).

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