

## ARMPS–HWM: New Software for Sizing Pillars for Highwall Mining

The use of highwall mining systems (Figure 1) has increased substantially in open-pit coal mines. It is used where overburden depth exceeds economical recovery. Highwall stability remains the major safety concern during highwall mining. The Mine Safety and Health Administration requires highwall mining operators to follow ground control plans that specify the pillar sizes necessary to prevent a pillar collapse that would threaten highwall stability.

NIOSH has developed the Analysis of Retreat Mining Pillar Stability-Highwall Mining (ARMPS–HWM) computer program to assist mine planners with pillar design. Based on extensive research into instances of highwall mining pillar instability and pillar collapses in underground mines, ARMPS–HWM uses the Mark-Bieniawski formula to estimate the strength of long strip pillars. The suggested design procedure addresses the following issues:

- The number of holes between barrier pillars;
- The size of the individual web pillars;
- The size of the barrier pillars; and
- The stability factor of the overall design.

The program is simple to install and easy to use. It contains extensive “Help” files that provide more background on the research upon which design formulas are based. The Help files also contain suggestions for highwall mining through old auger holes and for close-proximity, multiple-split highwall mining.

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Figure 1.—Highwall mining, showing a barrier pillar (left) and a web pillar (right).

To obtain a free copy of ARMPS–HWM and other NIOSH ground control software packages, visit the NIOSH Ground Control topic page at: [www.cdc.gov/niosh/mining/topics/groundcontrol/groundcontrol.htm](http://www.cdc.gov/niosh/mining/topics/groundcontrol/groundcontrol.htm). You may also contact Kim Mitchell at 412–386–6552, e-mail: [KAMitchell@cdc.gov](mailto:KAMitchell@cdc.gov). Or you may complete the order form below, detach, and mail to: Kim Mitchell, NIOSH Pittsburgh Research Laboratory, Cochran Mill Rd., P.O. Box 18070, Pittsburgh, PA 15236–0070, or fax to 412–386–6891.

To receive other information about occupational safety and health topics, call 1–800–35–NIOSH (1–800–356–4674), or visit the NIOSH Website at [www.cdc.gov/niosh](http://www.cdc.gov/niosh)

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