AGAPITO ASSOCIATES, INC.
CONSULTING ENGINEERS

May 5, 2000 226-07

Laine Adair
General Manager
GENWAL Resources, Inc.
195 North 100 West
PO Box 1420
Huntington, UT 84528

RE: **Barrier Pillar to Protect Bleeders for Panel 15, South of West Mains**

Dear Laine,

This letter summarizes results of the analysis of the effects of barrier pillar widths on future bleeder entry stability for Panel 15, south of the west mains. Results of computer models can be found in Figures 1, 2, and 3. Empirical barrier design methods have been applied and are summarized in Figure 4 as an additional aid. The study was initiated during my site visit on March 15, 2000. These analyses were completed in April and the results communicated to you during a conference call involving Rex Goodrich, Kyle Free, and myself on April 5, 2000. This letter provides the written backup to support the decision to proceed with barrier pillars of 240-ft width. The analysis presented was performed by Kyle Free.

PURPOSE AND SCOPE OF WORK

The purpose of the study was to provide analytical support for a decision to select the width of the bleeder barrier pillar for Panel 15. Two sizes, 260 and 300 ft, were considered. The analysis evaluates the effects of LW mining-induced stresses on the barrier pillars and bleeder entries. EXPAREA models of the area, including Panels 14, 15, and 16, were created and analyzed to estimate how stresses redistribute eastward from the gob toward the bleeders. The models assume a mining height of 7.3 ft and a variable depth of cover. Rock properties consistent with previous models of the mine were selected. Two mine geometries were modeled:

1. Three LW panels **without** bleeder entries [Figure 1].
2. Three LW panels **with** bleeder entries [Figure 3].

AAI004285

DISCUSSION OF ATTACHMENTS

Figure 1 depicts a scenario in which Panels 14, 15, and 16 are fully extracted and no bleeder entries exist. Plots of vertical stresses and the change in vertical stresses due to LW mining are shown. The vertical stress at 260 ft, 300 ft, and 400 ft from the outer startup entry of Panel 15 are estimated to increase by 16.4%, 15.9%, and 12.1%, respectively, as a result of the longwall mining of Panels 14, 15, and 16. This increase in stress is the average increase along the face length of Panel 15. A cross section plot (A-A') of the vertical stress increase was created to show the rate of decrease in mining-induced stresses with distance from the startup entries (Figure 2). If the bleeders were located 260 ft from the starter rooms, at the specific location of section A-A', they would experience a 1.3% increase in stress as compared to if the bleeders were at 300 ft. If the bleeders were at 400 ft from the starter room, the stress change would be 4.9% less than if located at 260 ft from the starter room.

Figure 3 provides modeling results for two cases of a scenario in which bleeder entries have been developed forming a 260-ft barrier pillar to the east of Panel 15. In Case 1 only the development of the LW panels is complete, and in Case 2 the panels have been fully extracted. The average pillar stress of the yield pillar annotated in Figure 3 was estimated to be 1820 psi for Case 1 and 2120 psi for Case 2. This represents a 16.5% stress increase caused by LW mining. (This is very close to the expected stress increase indicated in Figures 1 and 2.)

Figure 4 gives a summary of recommended barrier pillar widths by various empirical methods. The design widths shown here might be helpful as an additional source on which to base decisions. For a depth of 1000 ft, all the methods support a barrier pillar of 260 ft or less. At 1500 ft of cover, three of four methods suggest a barrier pillar of less than 260 ft.

DISCUSSION OF BARRIER PILLAR SIZING

The discussion on barrier pillar sizing in this location must consider the stress redistribution resulting from longwall mining, the geologic variability along the bleeder entries, the expected operational life of the bleeders, and the level of maintenance acceptable to management. The stress redistribution resulting from panel mining is projected to be less than 20% of the pre-existing stress conditions for barrier pillars greater than about 230 ft. This change in stress should not be significant given the depth of cover and pillar sizing in the bleeders. The geologic variability along the bleeders cannot be predicted, but given the proximity of the bleeders to Joe's Valley Fault and the potential to intersect splays or associated sub-faults, some variability in roof conditions resulting from variable geologic conditions can be expected. The expected operational life of the bleeders is less than three years, which is sufficient to complete mining of Panels 15 through 18. There is some possibility that the bleeders may be required to function longer if GENWAL mines the southern leases. If this were a high probability, consideration should be given to a larger barrier pillar and/or a three-entry bleeder. Maintenance of the bleeders is required for barrier pillar size and would be similar if the barrier pillars were 240 ft and up to 300-ft wide. To minimize any potential for stress overloading resulting from panel mining, or to minimize maintenance and to provide long term stability (greater than three years), a barrier pillar of 400 ft would be required.

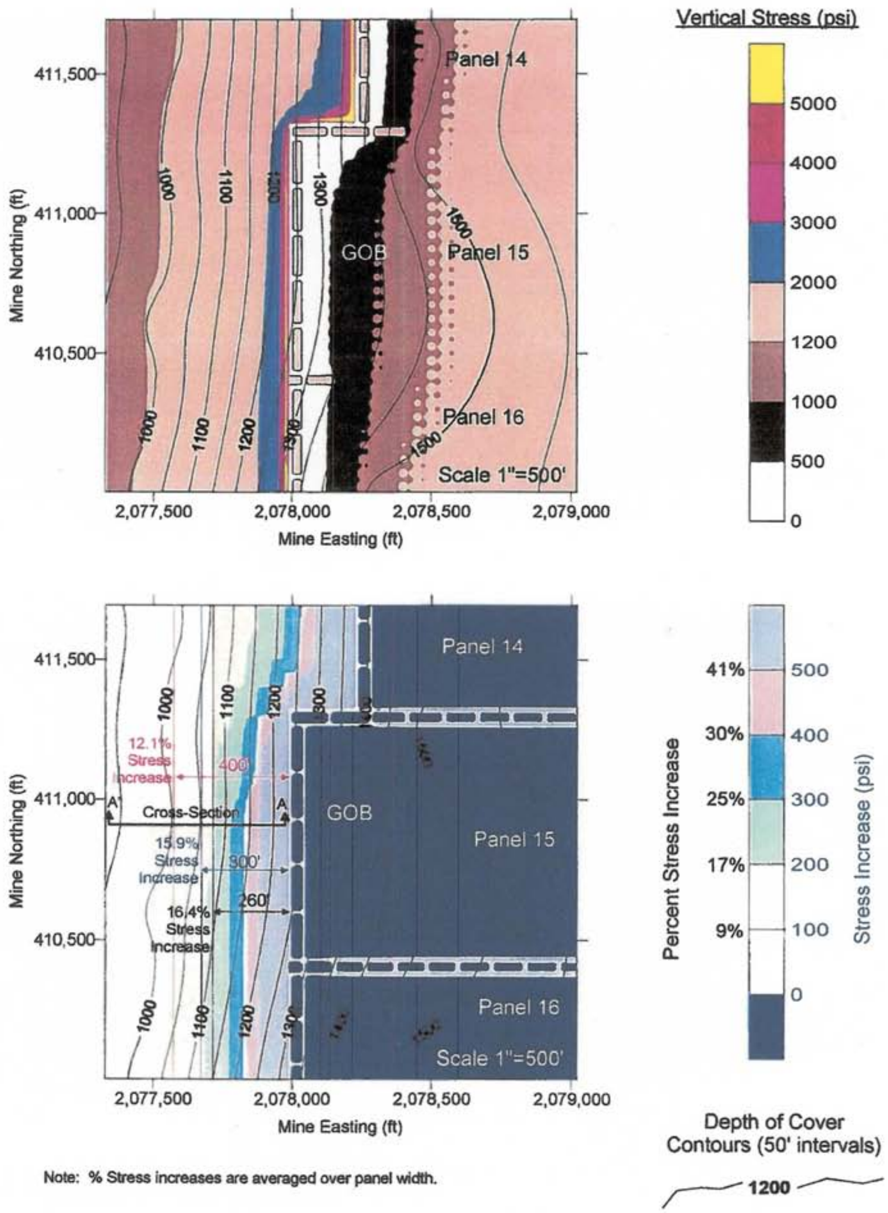
We appreciate the opportunity to visit your mine and work with you and your staff. If you have any questions, please call Rex or myself.

Yours sincerely,

Michael P. Hardy
Principal

cc: Sam Quigley
MPH/pg

AAI004286



04-24-00 ; Projects/Genwal/barrierwidth.srf ; ksf

Figure 1. Vertical Stress Distribution in Area of Barrier Pillar, With Mining of Panels 14 Through 16

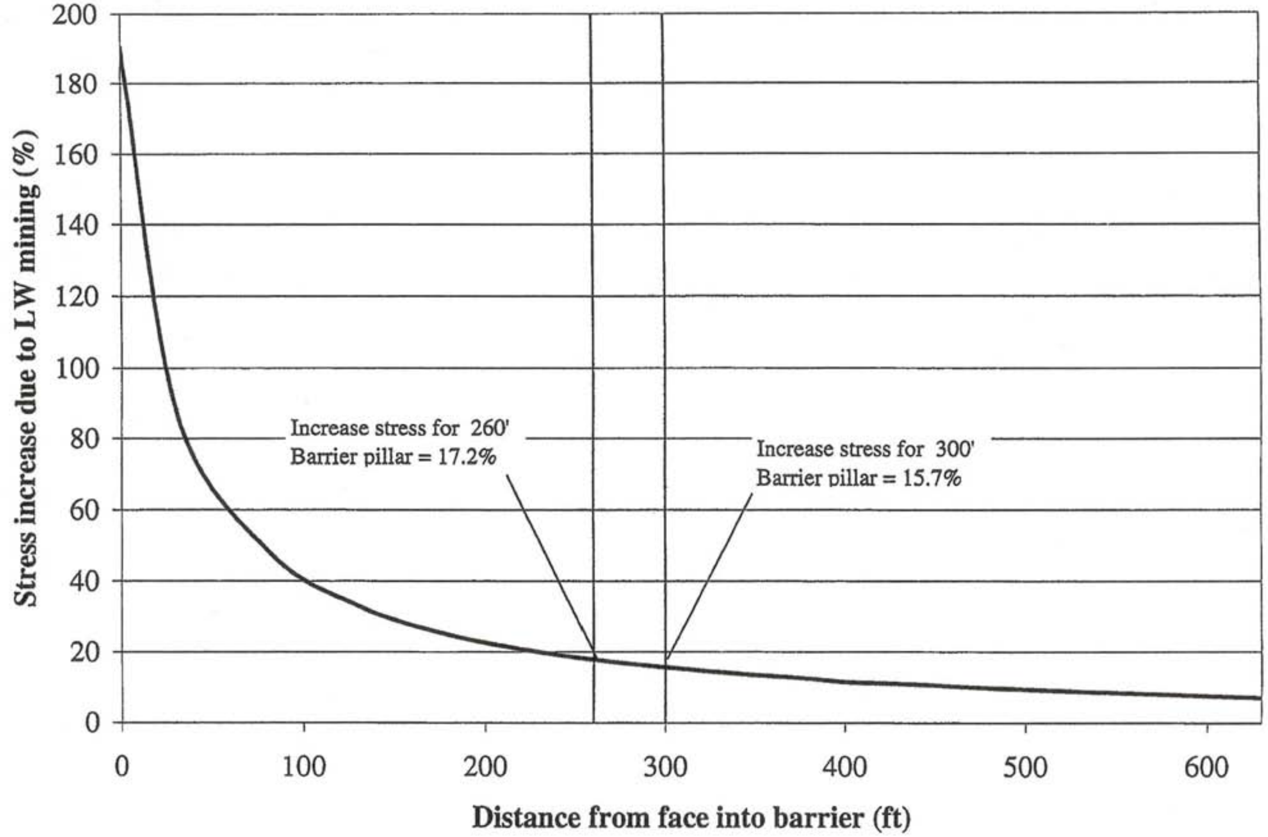


Figure 2. Vertical Stress Change from Starter Room Access Drift as Percent of Pre-existing Vertical Stress

Genwal
Barrirer Width Analysis
(226-07)
ksf';Genwal/x-sect.xls;4/24/00

AAI004288

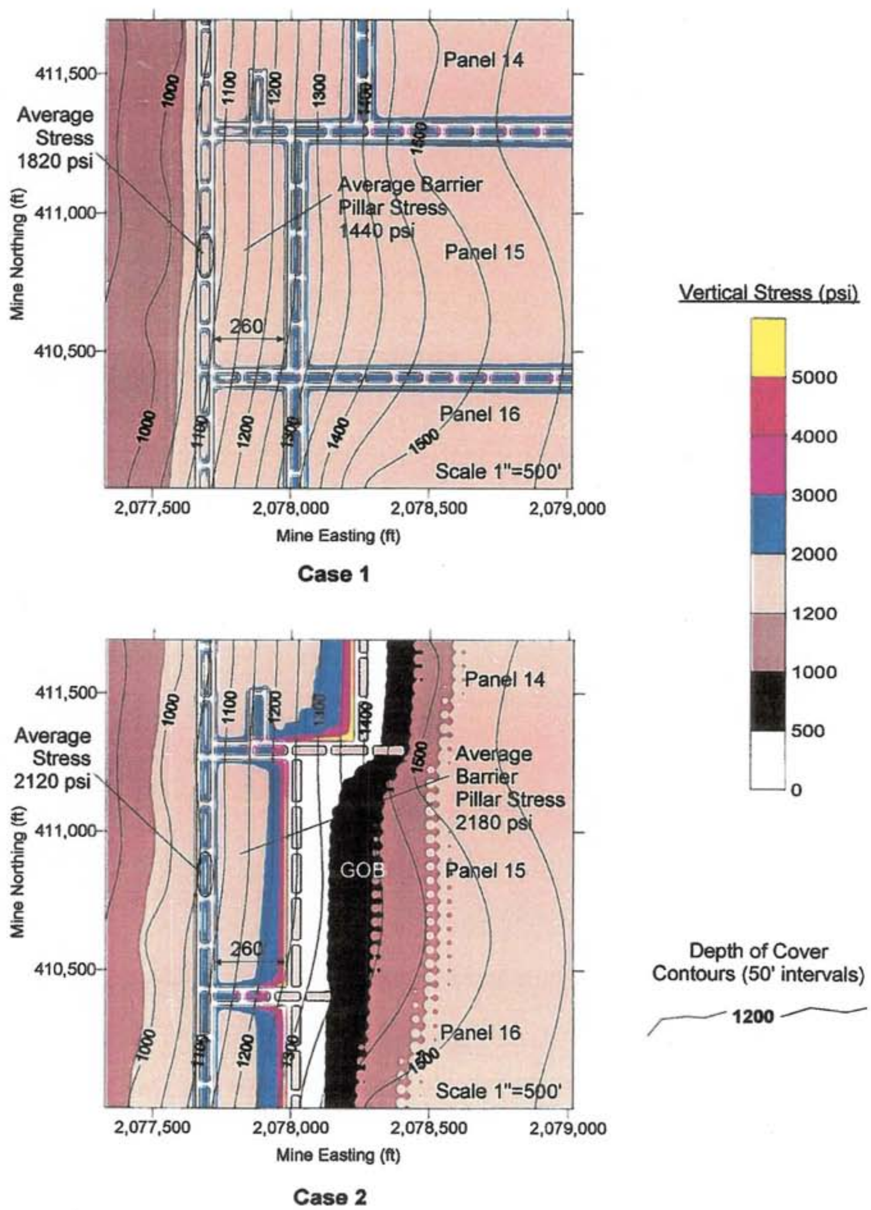


Figure 3. Vertical Stress in Barrier and Bleeder Pillars for 260-ft Barrier Pillar

04-24-00 ; Projects/Genwal/bleederbarrierwidth.srf ; ksf

BARRIER PILLAR DESIGN
Longwall Mining

BARRIER DESIGN	DEPTH OF COVER			
	1,000 ft	1,500 ft	2,000 ft	2,500 ft
MINING PARAMETERS				
Longwall Panel Width (ft)	780.0	780.0	780.0	780.0
Number of Mined Adjacent Longwall Panels (*Prior to arch collapse*)	2	2	2	2
Pillar Height (ft)	7.3	7.3	7.3	7.3
COAL STRENGTH PROPERTIES				
Specimen* Unconfined Compressive Strength (psi)	5,000	5,000	5,000	5,000
CALCULATED BARRIER WIDTHS				
NORTH AMERICAN METHOD (USBM 1995)	260	430	620	870
HOLLAND RULE OF THUMB (Holland 1973)	150	170	200	NA
HOLLAND CONVERGENCE METHOD (Holland 1973)	210	230	250	NA
PENNSYLVANIA MINE INSPECTOR'S FORMULA	150	200	250	NA

* "Specimen" indicates small scale laboratory test results versus rock mass scale values.

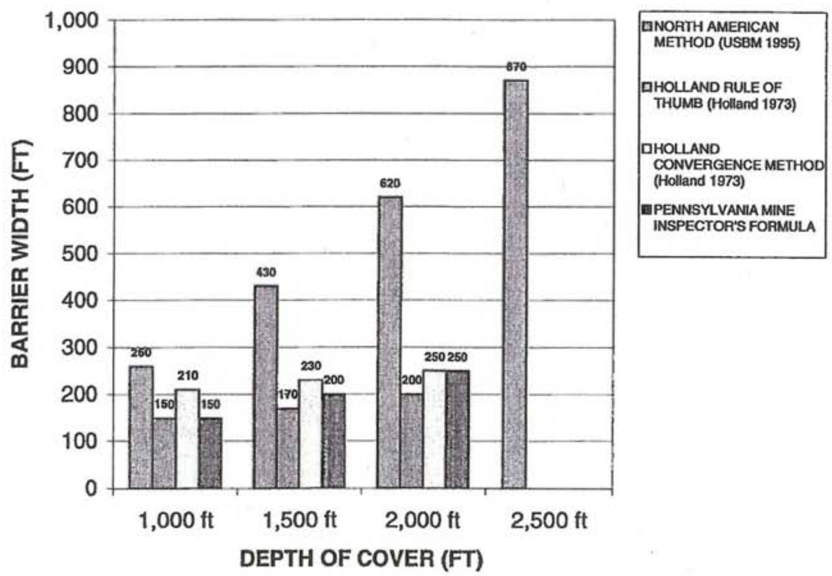


Figure 4. Barrier Pillar Sizes from Empirical Methods