Appendix W - MSHA Main West 2006 ARMPS

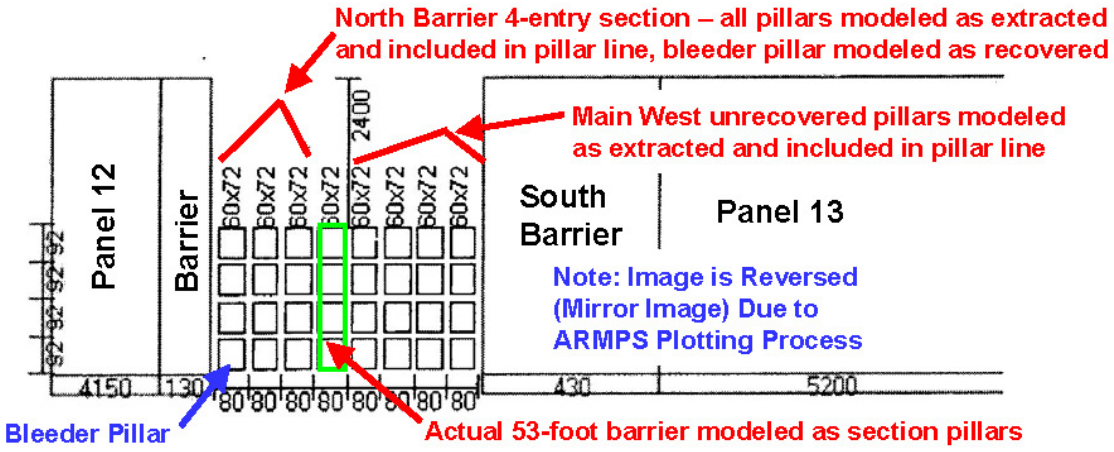
As part of a plan review involving the AAI August 2006 analysis for pillar recovery in the Main West North and South Barriers inby crosscut 107, MSHA District 9 conducted an independent ARMPS study. Based on the 9 Left – 1st North pillar recovery panel, MSHA established that a minimum ARMPS PStF should be 0.42. To assess the North Barrier section pillar recovery, a model was constructed where the sealed portion of the Main West entries and the North Barrier section entries were combined to form the 9-entry geometry shown in Figure 117. The projected South Barrier section pillar recovery was also studied. In a manner similar to the North Barrier section, the South Barrier section pillar recovery was modeled as the 9-entry geometry shown in Figure 118 where Main West and South Barrier section pillars are combined.

In the North Barrier section analysis, the pillar extraction row included all nine entries as if pillar recovery included extracting pillars from Main West and the barrier separating Main West and the North Barrier section. In the South Barrier section analysis, the pillar extraction row also included all nine entries with the barrier separating Main West and the South Barrier section modeled as an extracted section pillar. This layout generates low pillar stability values in order to model a worse case scenario, considering that only two pillars per row were to be recovered in the North and South Barrier sections, and not eight pillars per row as modeled by MSHA. The MSHA Main West 2006 analysis did not address barrier pillar stability factors.

At 2,000 feet of overburden, the MSHA Main West 2006 ARMPS pillar stability values are under the 0.42 MSHA derived minimum criteria for the pillar stability values. The MSHA analysis led to further discussion between Owens and GRI concerning the AAI study. After discussing MSHA's concerns with GRI, Owens agreed with AAI's analysis.

At the time of the MSHA 2006 study, 80 x 92-foot center pillars were proposed for the South Barrier section. MSHA District 9 did not run ARMPS studies for the as-mined South Barrier section pillar design having 80 x 130-foot center pillars and a 40-foot barrier slab cut.

Example of MSHA North Barrier ARMPS Model

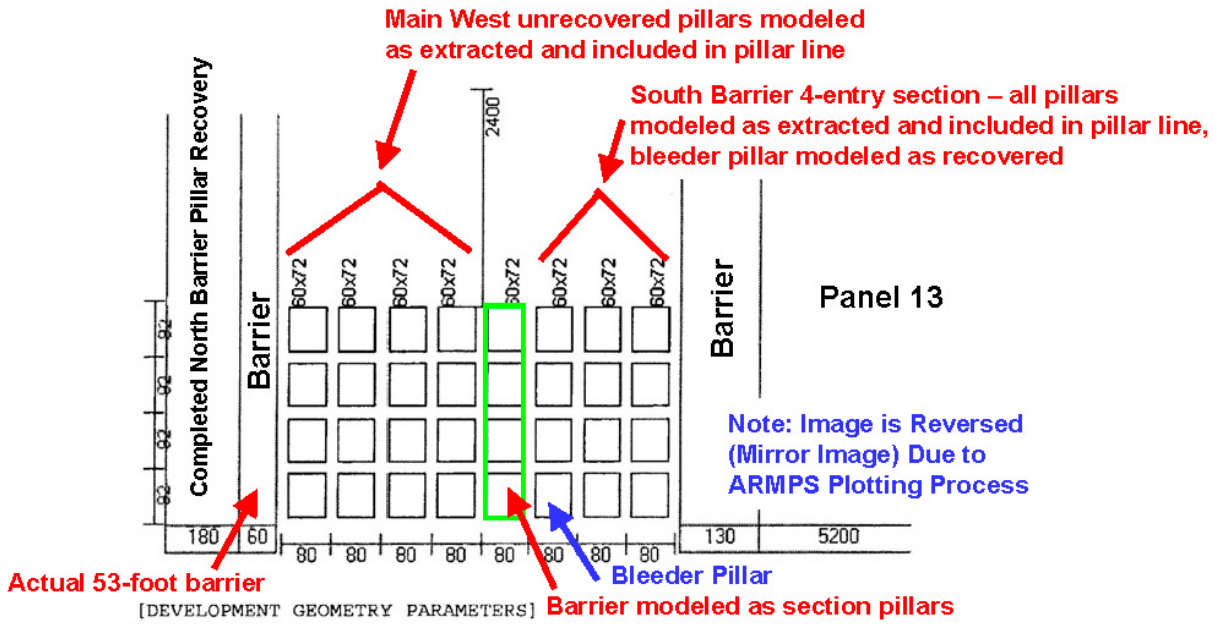



```
[DEVELOPMENT GEOMETRY PARAMETERS]
Entry Height.....................................8 (ft)
Depth of Cover..................................2000 (ft)
Crosscut Angle..................................90 (deg)
Entry Width.....................................20 (ft)
Number of Entries...............................9
Crosscut Spacing................................92 (ft)
Center to Center Distance #1....................80 (ft)
Center to Center Distance #2....................80 (ft)
Center to Center Distance #3....................80 (ft)
Center to Center Distance #4....................80 (ft)
Center to Center Distance #5....................80 (ft)
Center to Center Distance #6....................80 (ft)
Center to Center Distance #7....................80 (ft)
Center to Center Distance #8....................80 (ft)

[DEFAULT PARAMETERS]
In Situ Coal Strength..........................900 (psi)
Unit Weight of Overburden.......................162 (pcf)
Breadth of AMZ..................................223 (ft)
AMZ set automatically

[RETREAT MINING PARAMETERS]
Loading Condition..............................TWO SIDES + ACTIVE GOB
Extend of Active Gob............................2400 (ft)
Abutment Angle of Active Gob....................21 (deg)
Extend of First Gob.............................4150 (ft)
Abutment Angle of 1st Gob.......................21 (deg)
Barrier Pillar Width of 1st Gob.................130 (ft)
Depth of Slab Cut in Barrier Pillar of 1st Gob....0 (ft)
Extend of Second Gob............................5200 (ft)
Abutment Angle of 2nd Gob.......................21 (deg)
Barrier Pillar Width of 2nd Gob.................430 (ft)
Depth of Slab Cut in Barrier Pillar of 2nd Gob....0 (ft)

[ARMPS STABILITY FACTORS]

DEVELOPMENT.....................0.84
ACTIVE GOB......................0.54
ONE SIDE + ACTIVE GOB...........0.34
TWO SIDES + ACTIVE GOB..........0.34
```

ARMPS PStF noted to be under 0.42 MSHA derived threshold

Figure 117 - North Barrier MSHA 2006 ARMPS Model

Example of MSHA South Barrier ARMPS Model




```
[DEVELOPMENT GEOMETRY PARAMETERS]
Entry Height.....8 (ft)
Depth of Cover.....2000 (ft)
Crosscut Angle.....90 (deg)
Entry Width.....20 (ft)
Number of Entries.....9
Crosscut Spacing.....92 (ft)
Center to Center Distance #1.....80 (ft)
Center to Center Distance #2.....80 (ft)
Center to Center Distance #3.....80 (ft)
Center to Center Distance #4.....80 (ft)
Center to Center Distance #5.....80 (ft)
Center to Center Distance #6.....80 (ft)
Center to Center Distance #7.....80 (ft)
Center to Center Distance #8.....80 (ft)

[DEFAULT PARAMETERS]
In Situ Coal Strength.....900 (psi)
Unit Weight of Overburden.....162 (pcf)
Breadth of AMZ.....223 (ft)
AMZ set automatically

[RETREAT MINING PARAMETERS]
Loading Condition.....TWO SIDES + ACTIVE GOB
Extend of Active Gob.....2400 (ft)
Abutment Angle of Active Gob.....21 (deg)
Extend of First Gob.....180 (ft)
Abutment Angle of 1st Gob.....21 (deg)
Barrier Pillar Width of 1st Gob.....60 (ft)
Depth of Slab Cut in Barrier Pillar of 1st Gob....0 (ft)
Extend of Second Gob.....5200 (ft)
Abutment Angle of 2nd Gob.....21 (deg)
Barrier Pillar Width of 2nd Gob.....130 (ft)
Depth of Slab Cut in Barrier Pillar of 2nd Gob....0 (ft)

[ARMPS STABILITY FACTORS]

DEVELOPMENT.....0.84
ACTIVE GOB.....0.54
ONE SIDE + ACTIVE GOB.....0.38
TWO SIDES + ACTIVE GOB.....0.27
```

ARMPS PStF noted to be under 0.42 MSHA derived threshold

Figure 118 - South Barrier MSHA 2006 ARMPS Model