pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

MEMO

TO Thomas E. Donohue, P.G.
Professional Geologist Manager
Bureau of District Oil and Gas Operations

FROM Heather L. Campbell, P.G. Heather L Campbell
Licensed Professional Geologist
Bureau of Mine Safety

THROUGH Richard A. Wagner, P.E. Richard A. Wagner
Director
Bureau of Mine Safety

DATE 5/13/2021

RE BMS No. 4681
CMAP# 30121301
Company Name: Consol Pennsylvania Coal Company
Operation Name: Harvey Mine
Purpose: Leatherwood Stockdale Drill Plan

MESSAGE:

The Bureau of Mine Safety has completed its review of the above referenced Drill Plan. Leatherwood, LLC proposes to drill one conventional well in a chain pillar of the 4-A gate section in the Harvey Mine. The 4-A and 5-A longwall panels were mined out in 2019 and 2020, respectively. Given the time elapsed since mining occurred, subsidence is unlikely to impact this well. This pillar where the well will be located does not meet the 1957 Pillar Study of at least 40,000 ft^2. However, an independent ACPS pillar stability analysis was performed for the pillar and the Stability Factor is equal to 1.55. Additionally, the pillar has a width-to-height ratio greater than 12. This pillar should have long term stability.

Leatherwood, LLC does intend to stimulate this conventional well, but the pressures utilized in the stimulation procedure are expected to be much lower than the pressure used to stimulate an unconventional well.

The Bureau of Mine Safety's review of this plan is limited to safety precautions as they pertain to mine safety and pillar stability. The procedures outlined in this plan are similar to other plans in use and approval is recommended.

The Bureau of Mine Safety has no further comments.

CNX Center– CNX COAL
Pennsylvania Operations
1000 CONSOL Energy Drive
Canonsburg, PA 15317

phone: 724/663-7106
fax: 724/663-7159
e-mail: caseysaunders@consolenergy.com
Casey V. Saunders
Manager Coal/Gas Coordination

February 22, 2021

Mr. Richard A. Wagner, P.E.
Director, Bureau of Mine Safety
DEP New Stanton District Office
132 Broadview Road
New Stanton, Pennsylvania 15672

Re: Stockdale Well
Proposed Leatherwood Gas Well
Harvey Mine ID 36-10045
4-A Section

Dear Mr. Wagner:

The Harvey Mine submits the plan for Leatherwood, LLC (a CONSOL subsidiary) to drill a conventional gas well in a chain pillar of the 4-A gate section in the Harvey Mine. The proposed well will have its own well pad and be located within a substantial pillar in the 4-A gate section. The proposed gas well is located in a mined-out area that will eventually be sealed using 120 psi seals. Leatherwood will be submitting for a necessary drilling permit for the well from the PADEP and this plan is contingent on Leatherwood receiving it.

The attached mine pillar location drawing shows the as-mined pillar dimensions, and elevation for the proposed well. A general location map is also included to see where the proposed well is located within the "A" longwall district.

This plan applies to the time period commencing when drilling starts until the time that cementing of the coal protection casing is completed unless specifically stated otherwise.

Leatherwood and Consol Pennsylvania Coal Company (CPCC) agree to abide by drilling procedures listed below:

1. The proposed gas well will be approximately a nine-inch (9") diameter well bore that will pass through the Pittsburgh coal seam at a depth between 1,025' and 1,033' feet (elevation of 217 feet for the bottom of the coal seam). The proposed well will be lined with steel casing as indicated on the attached pipe schedule once the hole reaches the appropriate depth shown on the attached hole/pipe schedule.

2. The Surface Coordinates for the proposed well is shown on the attached drawings. This plan is for one (1) proposed well for the pad. No other wells will be drilled without subsequent authorization.

3. The CPCC's surface surveying contractor will provide survey control for Leatherwood to set up over the proposed well bore location. CPCC's surface surveying contractor will verify that the drill rig is set up over the correct coordinate, and provide the Northing, Easting, and elevation of the reference datum to ascertain the approximate depth to the top and bottom of the

Pittsburgh coal seam. Accurate mine floor elevations will be used to calculate the actual depth to the coal seam.

4. Once the surveyed location is verified, MSHA and the PA State Bureau of Mine Safety will be notified at least 48 hours prior to drilling. Leatherwood will proceed with drilling the well to a depth of 30 feet above the top of the coal seam. After drilling has stopped 30 feet above the top of the coal seam, a well deviation survey will be conducted with gyro readings within 100 feet of the top of coal by an independent, qualified well service provider who will determine the approximate location of the bottom of the well bore. A copy of this survey will be maintained and made available for inspection.

5. The total well deviation shall not be closer than 40' to the edge of the coal pillar. If the deviation survey confirms that the well deviation is projected to not be closer than 40' to the edge of the coal pillar, drill through procedures may continue.

6. If the well bore was closer than 40 feet from the edge of the coal pillar or if Leatherwood elects to abandon the well, Leatherwood shall grout the well boring completely, using approved procedures to assure a uniform and complete sealing of the open well bore in accordance with applicable requirements.

7. The Harvey Mine will be evacuated while Leatherwood drills from 30 feet above the top of the coal to 10 feet below the base of the coal. If the well is projected to be more than 40 feet from the edge of the pillar, and before drilling is to resume down to, and through the Pittsburgh Coal, The General Mine Foreman for the Harvey Mine, or its designee, will notify Leatherwood that all persons are out of the Mine. Once official notification is received that all persons are out of the Mine, only then, will Leatherwood resume drilling down to, and through the Pittsburgh coal seam to a point at least 10 feet below the bottom of coal elevation. If circulation of drilling fluids is lost at any time during the drilling process from 30 feet above to 10 feet below the coal, drilling will cease, and the hole will be grouted completely from the bottom of the well boring to the surface. The maintenance of drilling fluids and return of cuttings to the surface will serve to verify the drilled wellbore penetrated through the solid coal barrier and is not connected to the mine void.

8. If a rig break down occurs, or other factors prevent drilling while drilling between 30 feet above the coal seam to 10 feet below the coal seam, drilling activities will cease. At this time, the Harvey Mine can re-enter the mine until it is determined that drilling can resume in this zone. Before drilling operations resumes, the Harvey Mine will be evacuated and Leatherwood must receive notification from the Harvey Mine Foremen or its designee that all persons are out of the mine.

9. A CPCC qualified person will monitor the drilling from the surface until the cementing of the coal protection casing is complete. A CPCC qualified person will be on site when Leatherwood is drilling from 30 feet above the coal seam until the well bore is 10 feet below the coal seam. Methane checks will be made no longer than every 20 minutes by a qualified person within 5 feet of the borehole until drilling reaches 10 feet below the coal seam. If a 1% methane concentration or higher is detected, the CPCC qualified person will notify Leatherwood and the Harvey Mine. Harvey will then notify MSHA and the PA State Mine Inspector of the event. If Leatherwood determines that it has a well integrity issue, then it will correct the issue or plug the well.

10. Leatherwood will drill with a water based approved drilling fluid from the surface casing through the Pittsburgh coal seam until the coal protection casing is effectively installed and cemented to

the surface, in accordance with all approvals, State, and federal regulations. The fluid will be constantly circulated while drilling. The hole will be monitored, and a loss of circulation will indicate if a mine void has been intersected.

11. Leatherwood will continue to drill to the approximate depths shown on the schedule submitted (attached). Leatherwood will run pipe and continue drilling operations / activities to the gas bearing strata below the Pittsburgh coal seam in accordance with all applicable laws and regulations. Leatherwood will continuously monitor for potentially explosive gases. Leatherwood shall immediately notify CPCC, and CPCC will immediately notify MSHA and the PADEP Bureau of Mine Safety in the event that there is any indication of loss of circulation during drilling operations.

If there are any questions, or additional information is required, please call.

Sincerely,

Leatherwood LLC Representative:

Name (Printed): Casey V. Sanders (Assistant VP – Leatherwood)

Signature: Casey V. Sanders

Date: 3-8-2021

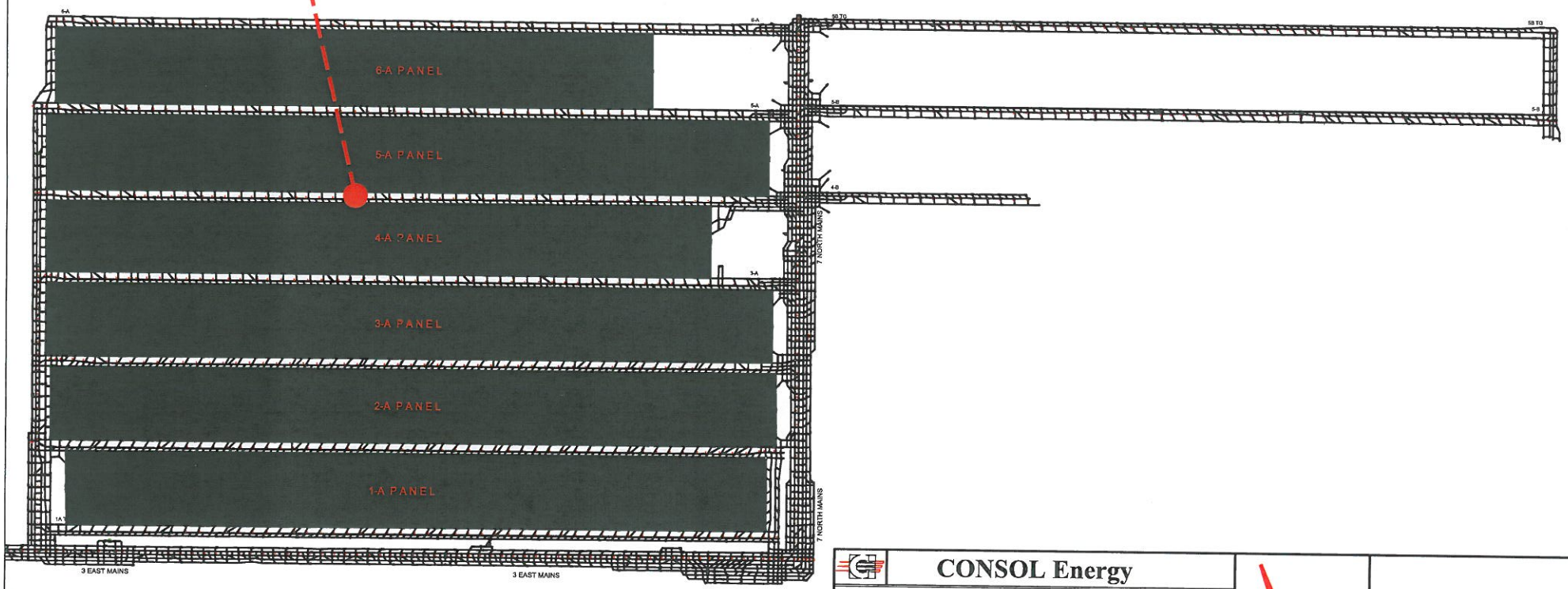
Harvey Mine Representative:

Name (Printed): Patrick Todd McNair

Signature: Patrick Todd McNair

Date: 3-8-2021

Stockdale Well



CONSOL Energy

PA Operations

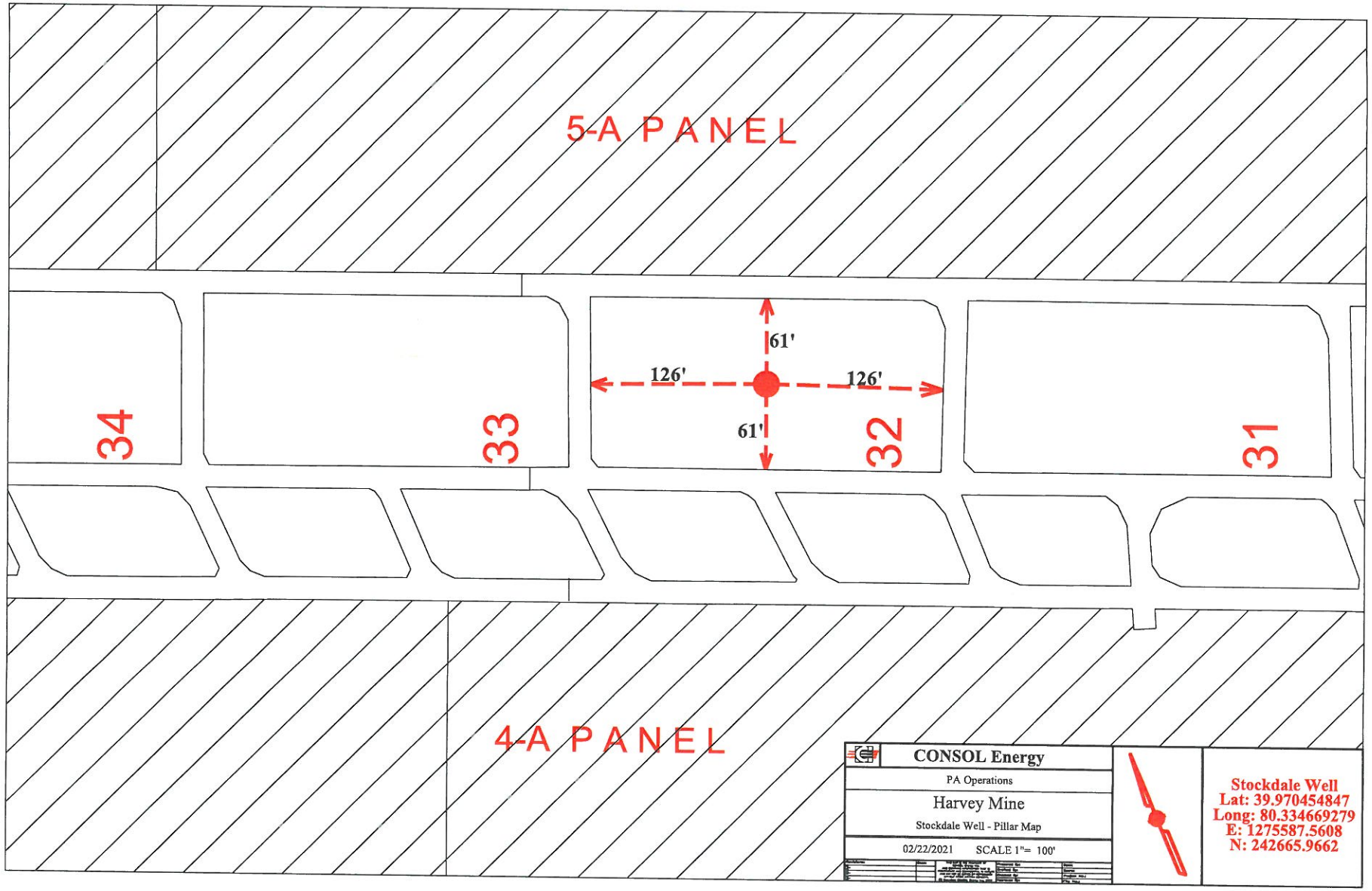
Harvey Mine

Stockdale Well - General Location Map

02/22/2021 SCALE 1"= 3,000'

Revisions:	Date:		Prepared By:	Date:
1) -			Drafted By:	Scales:
2) -			Checked By:	Project No.:
3) -			Approved By:	File No.:

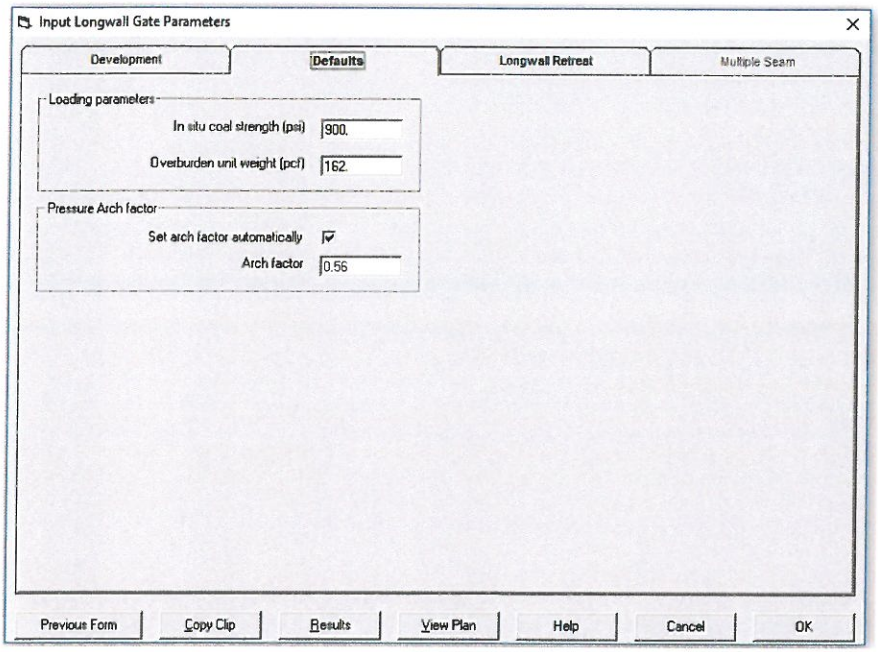
Stockdale Well
Lat: 39.970454847
Long: 80.334669279
E: 1275587.5608
N: 242665.9662

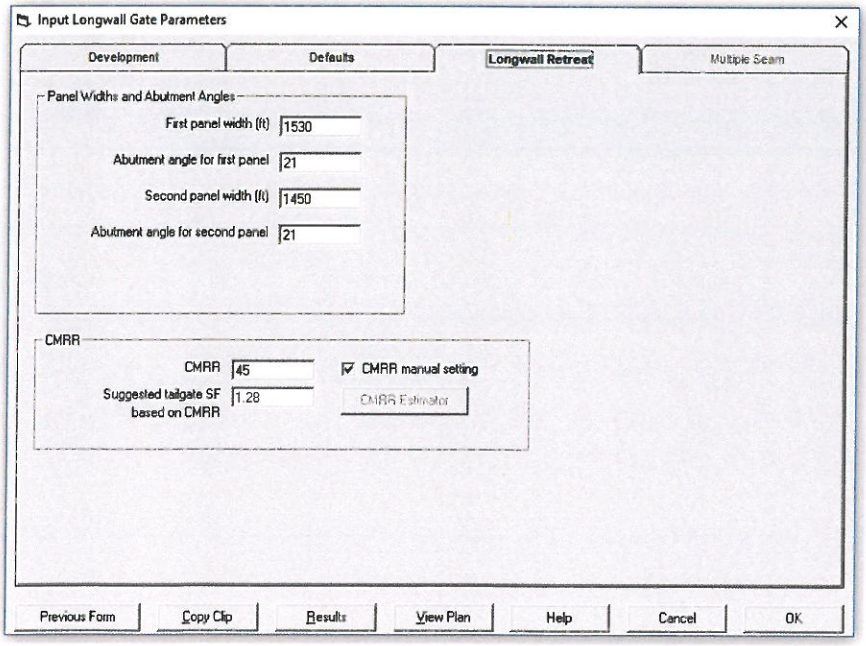

5-A PANEL
34
33
61'
126'
126'
61'
32
31
4-A PANEL
CONSOL Energy
PA Operations
Harvey Mine
Stockdale Well - Pillar Map
02/22/2021 SCALE 1"= 100'
Stockdale Well
Lat: 39.970454847
Long: 80.334669279
E: 1275587.5608
N: 242665.9662

Stockdale Pillar Stability Analysis

The purpose of this calculation is to evaluate the long-term stability of abutment pillars for the protection of the proposed Leatherwood Stockdale Well. The gas well will be located in a substantial pillar in the Harvey Mine in a mined-out area. Stability calculations were performed using 1.0.86.

The following images show the inputs that were used during the calculations:





The follwing outputs show a calculated factor of safety for isolated loading to be a 1.46.

ACPS Version: 1.0.86, 3/3/2021, 10:35:59

[ACPS Output]

[ACPS PILLAR STABILITY FACTORS]

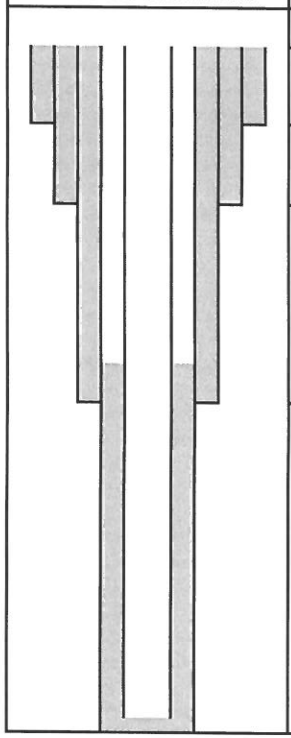
Development Loading.....	7.37
Headgate Loading.....	3.37
Bleeder Loading.....	2.47
TAILGATE Loading.....	1.62
Isolated.....	1.46
Suggested TAILGATE SF based on the CMRR=45...	1.28

[WARNINGS]

The Pressure Arch loading model used in ACPS was derived from analysis of case history data from the Western and Central Appalachian coalfields in the US. The overburden rock in these two coalfields is relatively strong. No research has been conducted to test the applicability of the pressure arch loading model in other coalfields.

Leatherwood LLC

Stockdale #1-Conventional Gas Well Drill Plan

Ground Elevation	1250'		Location	N: 242,665.9662		E: 1,275,587.5608	
	Hole Size	Casing	Geology	Top	Btm	Cement	Comments
	15"	13 3/8" casing	Conductor	20'		To Surface	-
	12-1/4"	9-5/8" casing	Deepest Water Well	185'		To Surface	-
			Fresh Water Casing	400' TVD			
	8-7/8"	7" casing	Sewickley	935'	940'	To Surface	Run Gyro 30' above Pittsburgh Coal
			Pittsburgh	1025'	1033'		
			Coal Protection Casing	1,533' TVD			Must have approval before drilling through pillar
	6-1/4"	4-1/2" casing	Big Injun	2178'	2428'	TOC to 1433'	-
			Thirty Foot Sand	2748'	2778'		
			Fifty Foot Sand	2863'	2913'		
			Nineveh Sand	2943'	2973'		
			Production Casing	3,223' TVD			

Campbell, Heather

From: Saunders, Casey V. <CaseySaunders@consolenergy.com>
Sent: Friday, April 16, 2021 10:26 AM
To: Campbell, Heather
Subject: RE: [External] Leatherwood Stockdale Well

Categories: Drill Plan

Good Morning Heather,

Yes we plan to do some stimulation. It will be nothing like an unconventional well though including the pressures and volumes of gas available. It is only enough to get enough gas for a landowner. This well is going to be a low pressure house gas well.

On a side note – did Scott retire? I knew he was getting close, but I couldn't remember what the date was.

Thanks,

Casey V. Saunders, P.E.
CONSOL ENERGY
Manager Coal/Gas Coordination
BMX Portal Office: 724-663-7106
CNX Center Office: 724-416-8441
Mobile: 540-460-0462

From: Campbell, Heather <heathcampb@pa.gov>
Sent: Thursday, April 15, 2021 2:22 PM
To: Saunders, Casey V. <CaseySaunders@consolenergy.com>
Subject: RE: [External] Leatherwood Stockdale Well

Good Afternoon Casey,

I am reviewing the drill plan for the Stockdale well you submitted to Scott earlier this week. Does Leatherwood intend to frack this conventional well? I know that it is often done to stimulate virtual wells.

Thank you,
Heather

Heather L. Campbell, PG | Licensed Professional Geologist
Department of Environmental Protection | Bureau of Mine Safety
New Stanton District Office
PO Box 133 | New Stanton PA 15672

From: Saunders, Casey V. <CaseySaunders@consolenergy.com>
Sent: Tuesday, April 13, 2021 12:50 PM
To: Hamilton, Scott <dahamilton@pa.gov>
Subject: [External] Leatherwood Stockdale Well

ATTENTION: *This email message is from an external sender. Do not open links or attachments from unknown sources. To report suspicious email, forward the message as an attachment to CWOPA_SPAM@pa.gov.*

Good Afternoon Scott,

I can't remember when your last day is, but I thought I would give this a try! CONSOL's subsidiary (Leatherwood) applied today to drill a conventional well through an existing pillar in the Harvey Mine. I attached a drill plan with our application when I sent it into DEP Oil and Gas. I wanted to send you a copy directly in case they did not send you one.

Please see attached drill plan.

Thanks,

Casey V. Saunders, P.E.
CONSOL ENERGY
Manager Coal/Gas Coordination
BMX Portal Office: 724-663-7106
CNX Center Office: 724-416-8441
Mobile: 540-460-0462

ACPS module build: 1.0.85
Project File: Untitled

[PROJECT SETTINGS]
Longwall Gate
Multiple Seam Conditions (for Development Only): NO
Units: (ft) (psi) (lbs)

[PROJECT TITLE]
Stockdale

[PROJECT DESCRIPTION]

[DEVELOPMENT GEOMETRY PARAMETERS]
Entry Height.....7 (ft)
Depth of Cover.....1025 (ft)
Crosscut Angle.....90 (deg)
Entry Width.....16 (ft)
Number of Entries.....3
Crosscut Spacing.....0 (ft)
Advanced Geometry Mode.....ON
Center to Center Distance #1.....136 (ft)
Center to Center Distance #2.....81 (ft)
Advanced Crosscut Spacing #1.....270 (ft)
Advanced Crosscut Spacing #2.....132 (ft)
Advanced Crosscut Angle #1.....90 (deg)
Advanced Crosscut Angle #2.....60 (deg)

[DEFAULT PARAMETERS]
In Situ Coal Strength.....900 (psi)
Unit Weight of Overburden.....162 (pcf)
Pressure Arch Factor.....0.57
Pressure Arch Factor Mode.....Set automatically
CMRR.....35
CMRR Region.....Northern Appalachia
CMRR Rock Type.....Claystone

[LONGWALL MINING PARAMETERS]
Width of First Panel.....1530 (ft)
Abutment Angle of First Panel.....21 (deg)
Width of Second Panel.....1450 (ft)
Abutment Angle of Second Panel.....21 (deg)

[ACPS Output]

[ACPS PILLAR STABILITY FACTORS]

Development Loading..... 7.67
Headgate Loading..... 3.56
Bleeder Loading..... 2.61
TAILGATE Loading..... 1.72
Isolated..... 1.55

Suggested TAILGATE SF based on the CMRR=35... 1.44

[WARNINGS]

The Pressure Arch loading model used in ACPS was derived from analysis of case history data from the Western and Central Appalachian coalfields in the US. The overburden rock in these two coalfields is relatively strong. No research has been conducted to test the applicability of the pressure arch loading model in other coalfields.

[DATA ABOUT THE PILLAR SYSTEM]

HLC 4/20/21

Pillar System Width.....217.0 (ft)
Depth to Pillar System Width Ratio.....4.7
Pillar System Breadth.....160.0 (ft)
Pillar System Area.....34720.0 (ft)*(ft)
Extraction Ratio within the Pillar System.....0.22
Tributary Area Load on the Pillar System.....5.77E+09 (lbs)
First Side Abutment Load.....32667069 (lbs)/(ft)
Second Side Abutment Load.....32667069 (lbs)/(ft)

R-FACTOR For First Side Abutment.....0.000
R-FACTOR For Second Side Abutment.....0.000

[DESIGN LOADINGS ON PILLAR SYSTEM (lbs) / (ft) of gate entry]

Development Loading..... 20,538,724 *
Headgate Loading..... 44,293,563 *
Bleeder Loading..... 60,301,338 *
*** Tailgate Loading..... 91,566,867
Isolated Loading.....101,366,989
* Adjusted by Pressure Arch Factor

[PILLAR PARAMETERS]

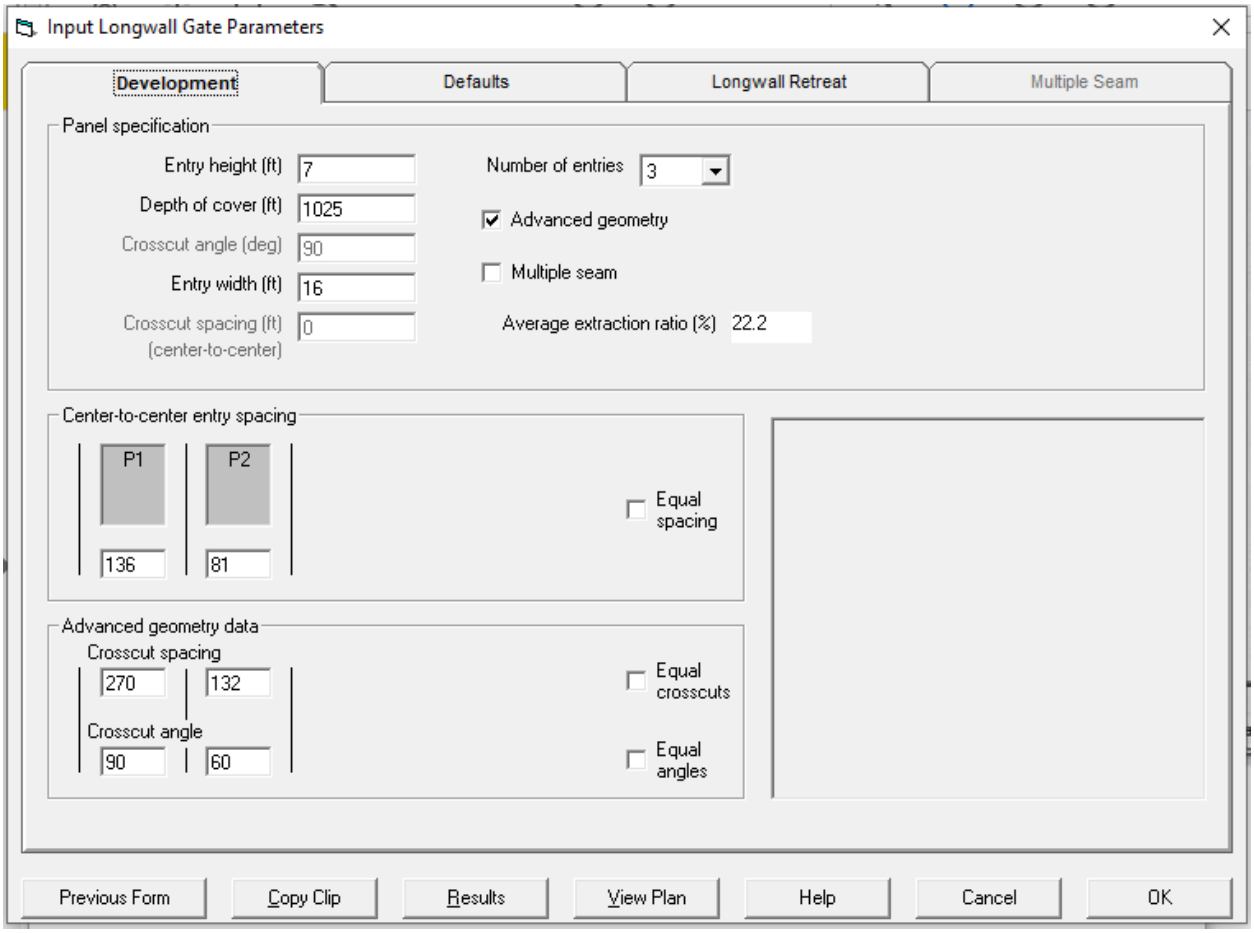
PILLAR	ENTRY CENTER (ft)	MINIMUM DIMENSION (ft)	MAXIMUM DIMENSION (ft)
1	136.00	120.00	254.00
2	81.00	65.00	113.52

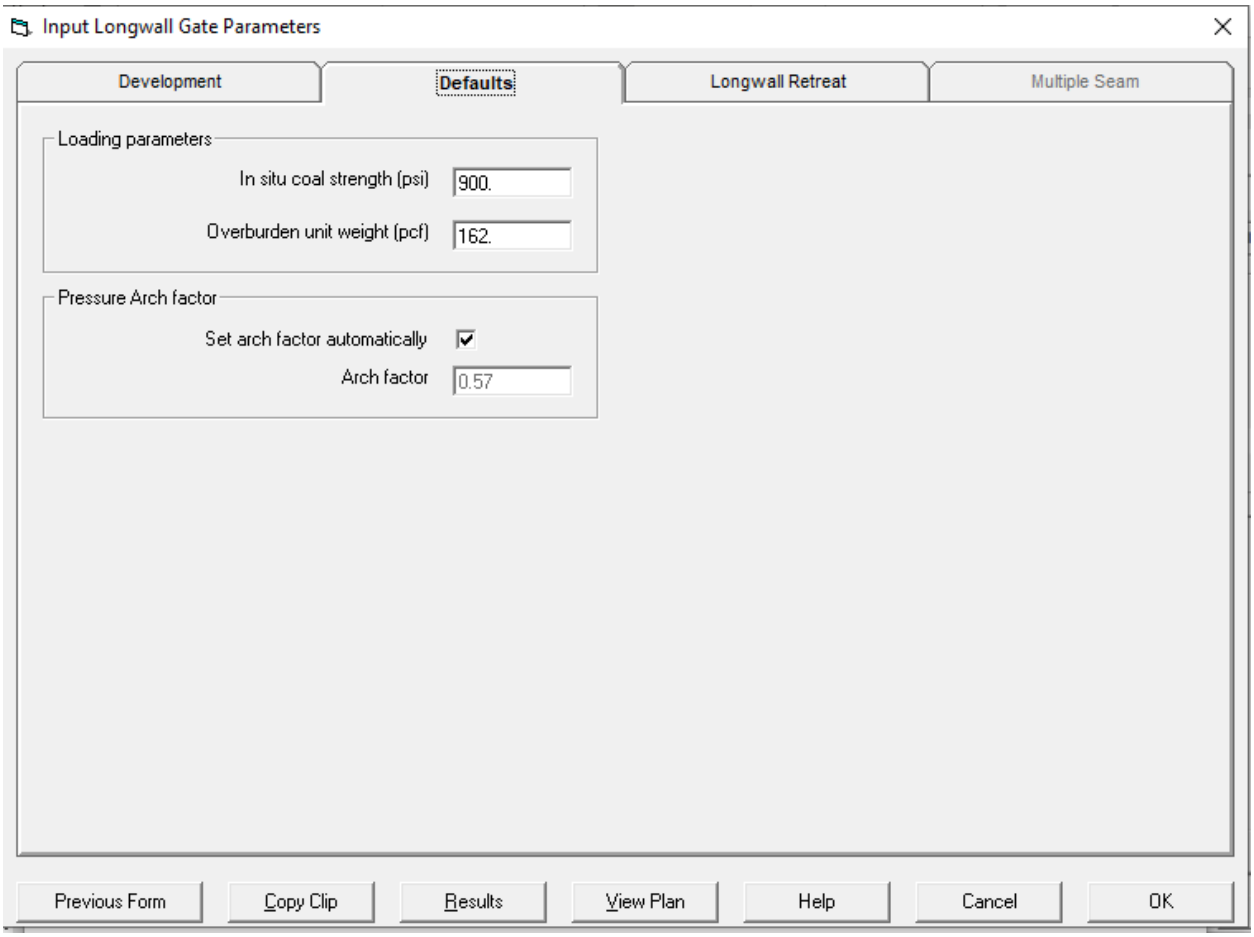
PILLAR	AREA (ft)*(ft)	STRENGTH (psi)	LOAD-BEARING CAPACITY (lbs)
1	3.05E+04	7595.39	3.33E+10
2	7.38E+03	4227.56	4.49E+09

TOTAL LOAD-BEARING CAPACITY OF THE PILLAR SYSTEM: 2.52E+10 (lbs)

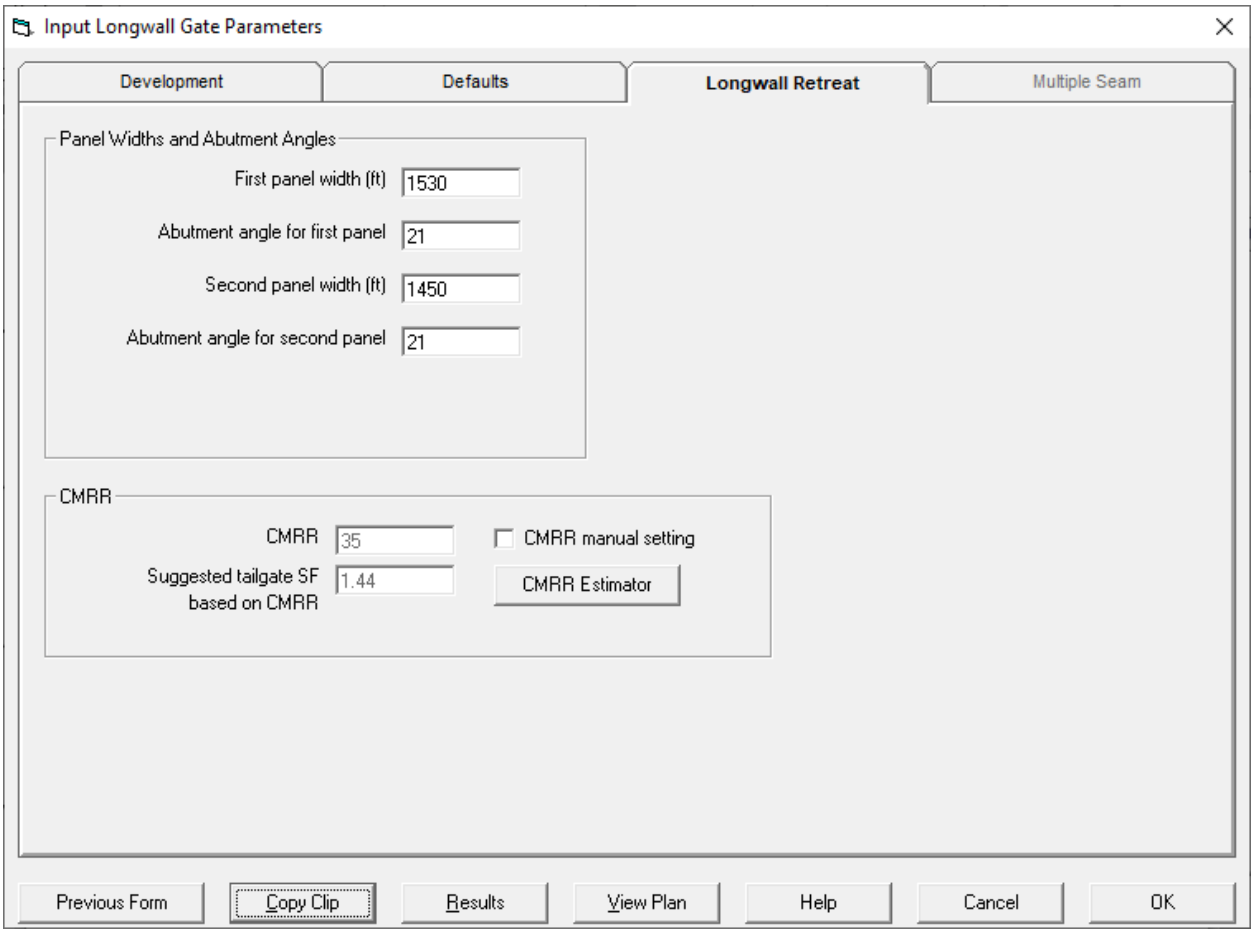
To view the distribution of Pillar Load Bearing Capacity
select 'View Plots->Settings->Pillar Load Bearing Capacity'

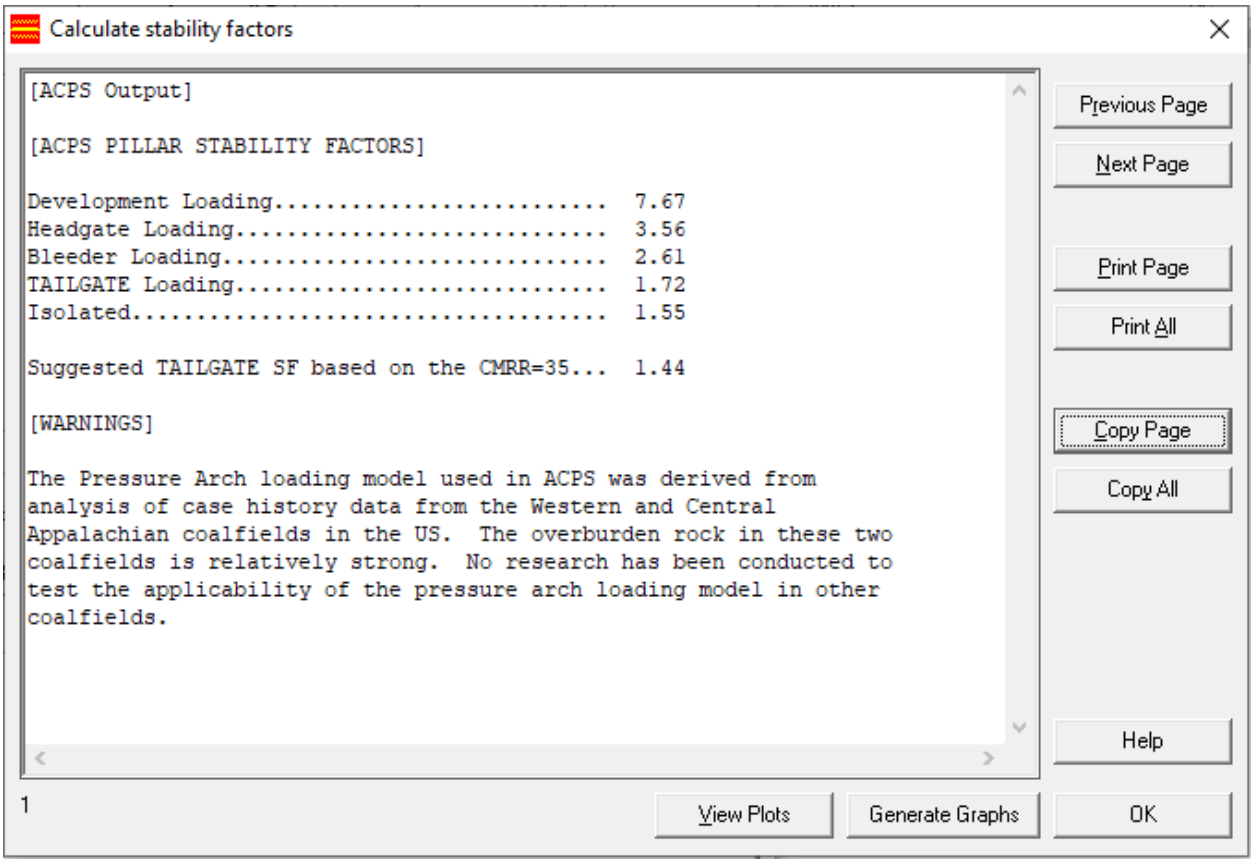
HLC 4/20/21


Input Longwall Gate Parameters
Development
Defaults
Longwall Retreat
Multiple Seam
Panel specification
Entry height (ft) 7
Depth of cover (ft) 1025
Crosscut angle (deg) 90
Entry width (ft) 16
Crosscut spacing (ft) (center-to-center) 0
Number of entries 3
Advanced geometry
Multiple seam
Average extraction ratio (%) 22.2
Center-to-center entry spacing
P1
P2
136
81
Equal spacing
Advanced geometry data
Crosscut spacing
270
132
Crosscut angle
90
60
Equal crosscuts
Equal angles
Previous Form
Copy Clip
Results
View Plan
Help
Cancel
OK


Input Longwall Gate Parameters
Development
Defaults
Longwall Retreat
Multiple Seam
Loading parameters
In situ coal strength (psi) 900.
Overburden unit weight (pcf) 162.
Pressure Arch factor
Set arch factor automatically
Arch factor 0.57
Previous Form
Copy Clip
Results
View Plan
Help
Cancel
OK

HLC 4/20/21


Input Longwall Gate Parameters
Development
Defaults
Longwall Retreat
Multiple Seam
Panel Widths and Abutment Angles
First panel width (ft)
1530
Abutment angle for first panel
21
Second panel width (ft)
1450
Abutment angle for second panel
21
CMRR
CMRR
35
CMRR manual setting
Suggested tailgate SF based on CMRR
1.44
CMRR Estimator
Previous Form
Copy Clip
Results
View Plan
Help
Cancel
OK


Calculate stability factors
[ACPS Output]
[ACPS PILLAR STABILITY FACTORS]
Development Loading..... 7.67
Headgate Loading..... 3.56
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TAILGATE Loading..... 1.72
Isolated..... 1.55
Suggested TAILGATE SF based on the CMRR=35... 1.44
[WARNINGS]
The Pressure Arch loading model used in ACPS was derived from analysis of case history data from the Western and Central Appalachian coalfields in the US. The overburden rock in these two coalfields is relatively strong. No research has been conducted to test the applicability of the pressure arch loading model in other coalfields.
Previous Page
Next Page
Print Page
Print All
Copy Page
Copy All
Help
1
View Plots
Generate Graphs
OK

HLC 4/20/21