



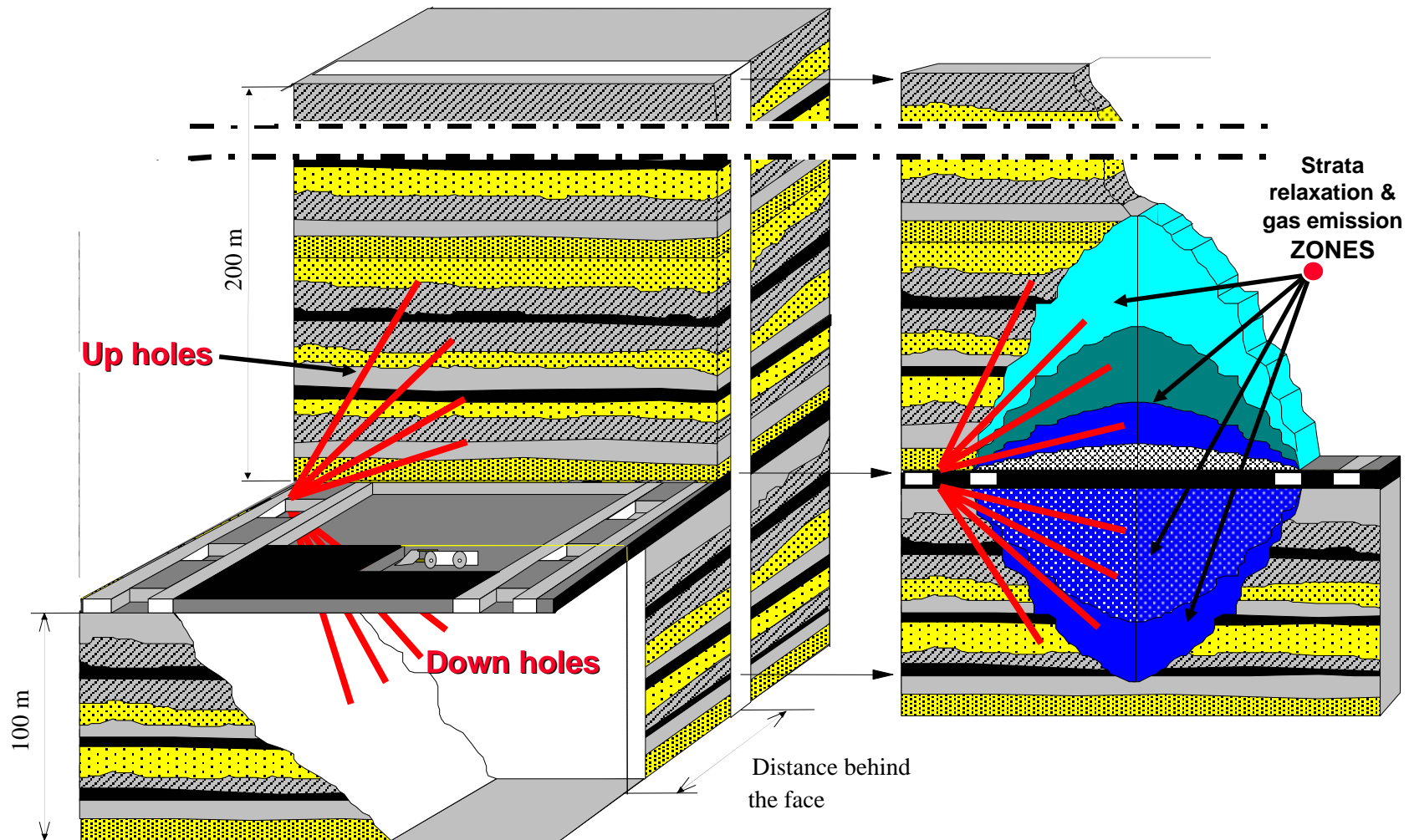
## *GRM - the geomechanical and Gas Release Model*

**This unique simulator-engineering tool can identify roof and floor strata relaxation and gas discharge zones associated with local geological, gas and mining conditions.**

**The program generates a graphical representation of roof & floor strata relaxation and gas release phenomenon associated with underground mine coal production - mining activities**



# GRM strata relaxation & gas release zones (simplified concept)





# GRM Geometry/Geology input data table

**Data**

Geometry/Geology | Lithology | Coal Seams

Mine Name: DEMO\_2004

Bore Name: Demo Bore

Panel Name: Demo Panel

Horizontal Stress

Ratio: 2.5

Direction: 30 (degrees)

Gas Reservoir Pressure: 1 (MPa)

Seam Depth: 500 (m)

Coal Seam

Lithology

Exploration Hole

Symmetry Axis

Coal Seam

Lithology

Seam Thickness: 2.5 (m)

Longwall Length: 2000 (m)

Retreat Rate: 10 (m/day)

Pillar Width: 25 (m)

Longwall Width: 250 (m)

Note: A horizontal stress ratio of 0 indicates no horizontal stress.

Note: A pillar width of 0 indicates a single heading.

Project Name: GRM

OK Cancel



Project Name: GRM

.....  
OK

Cancel

# GRM Coal Seams input data table

**Data**

Geometry/Geology | Lithology | **Coal Seams**

|   | DepthFrom (m) | DepthTo (m) | Seam Name | Mined |
|---|---------------|-------------|-----------|-------|
|   | 391.00        | 392.00      | CS1       | FALSE |
|   | 459.00        | 461.50      | CS2       | FALSE |
|   | 476.00        | 477.00      | CS3       | FALSE |
|   | 490.00        | 492.00      | CS4       | FALSE |
|   | 518.00        | 520.00      | CS5       | FALSE |
|   | 535.00        | 538.00      | CS6       | FALSE |
| ▶ | 556.00        | 557.00      | CS7       | FALSE |

Depth: 500    Working Seam    Thickness: 2.5

◀ ▶ ↺ ⛶ ⛷ ⛸ ⛹ ⛺ ⛻ ⛼ ⛽ ⛾ ⛿

Project Name: GRM

OK Cancel



# GRM software simulation sequence

Geometry/Geology    Lithology    Coal Seams

Mine Name: DEMO\_2004  
Bore Name: Demo Bore  
Panel Name: Demo Panel

Horizontal Stress  
Ratio: 2.5  
Direction: 30 (degrees)

Gas Reservoir Pressure: 1 (MPa)

Seam Depth: 500 (m)

Coal Seam    Lithology

Seam Thickness: 2.5 (m)

Symmetry Axis

Coal Seam    Lithology

Note: A pillar width of 0 indicates a single heading.

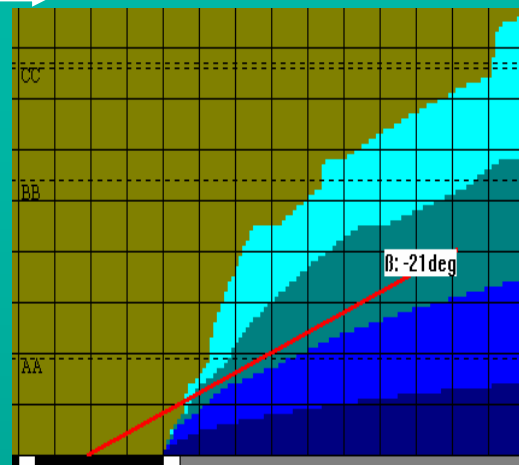
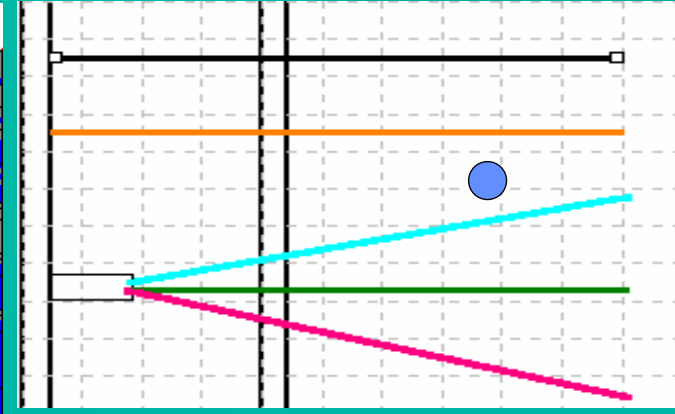
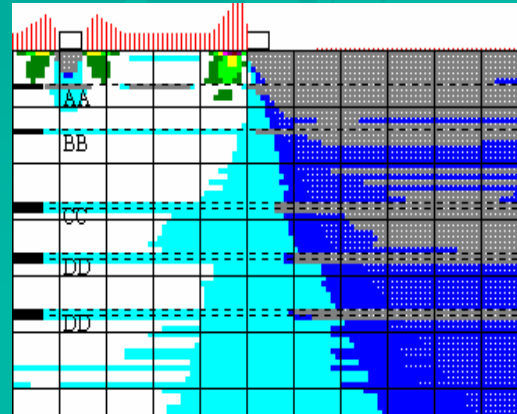
Pillar Width: 25 (m)    Longwall Width: 250 (m)

Longwall Length: 2000 (m)

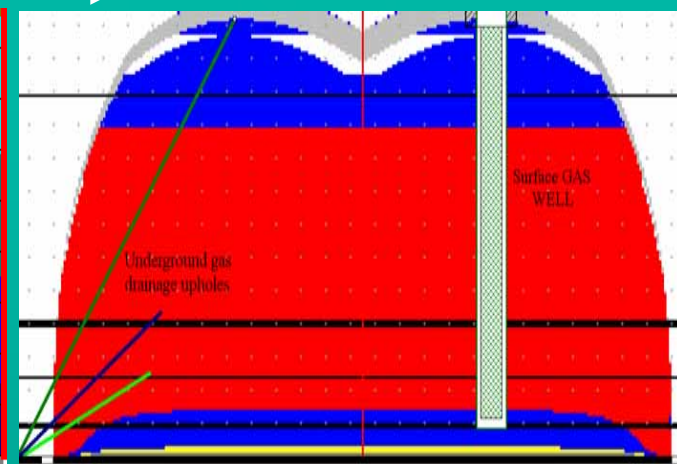
Retreat Rate: 10 (m/day)

Note: A horizontal stress ratio of 0 indicates no horizontal stress.

Input data



Strata relaxation  
outputs generation



Application for gas  
drainage systems design



## GRM Roofgas simulation

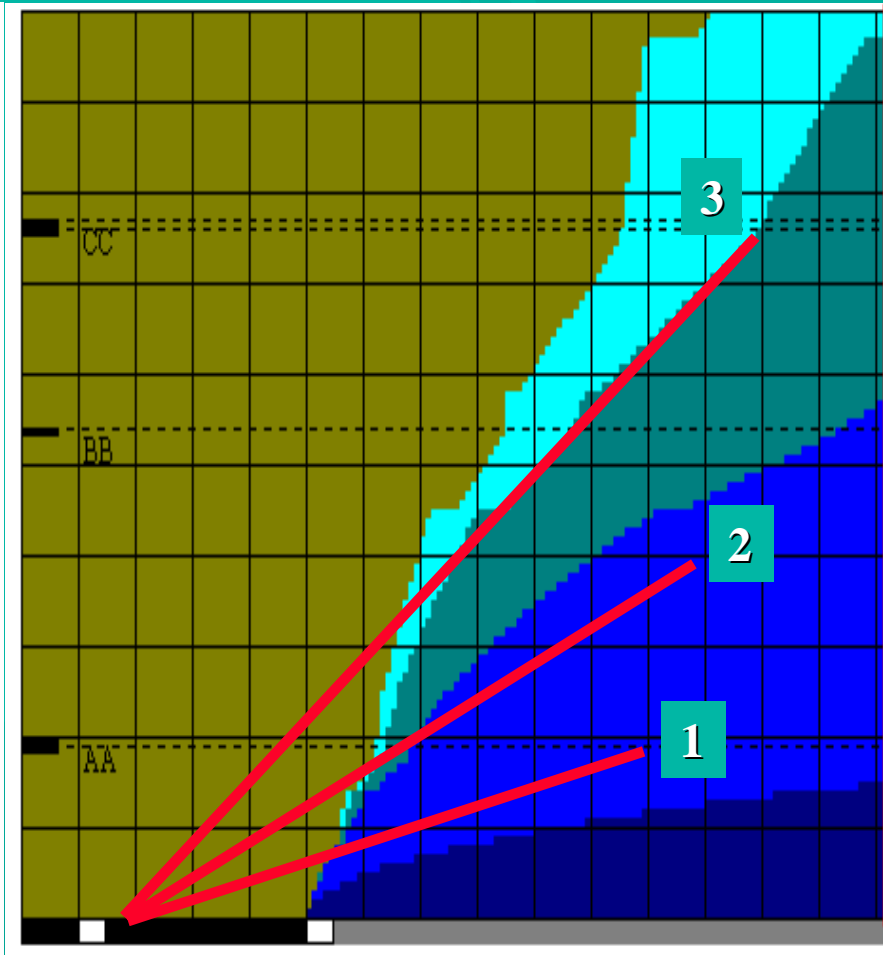
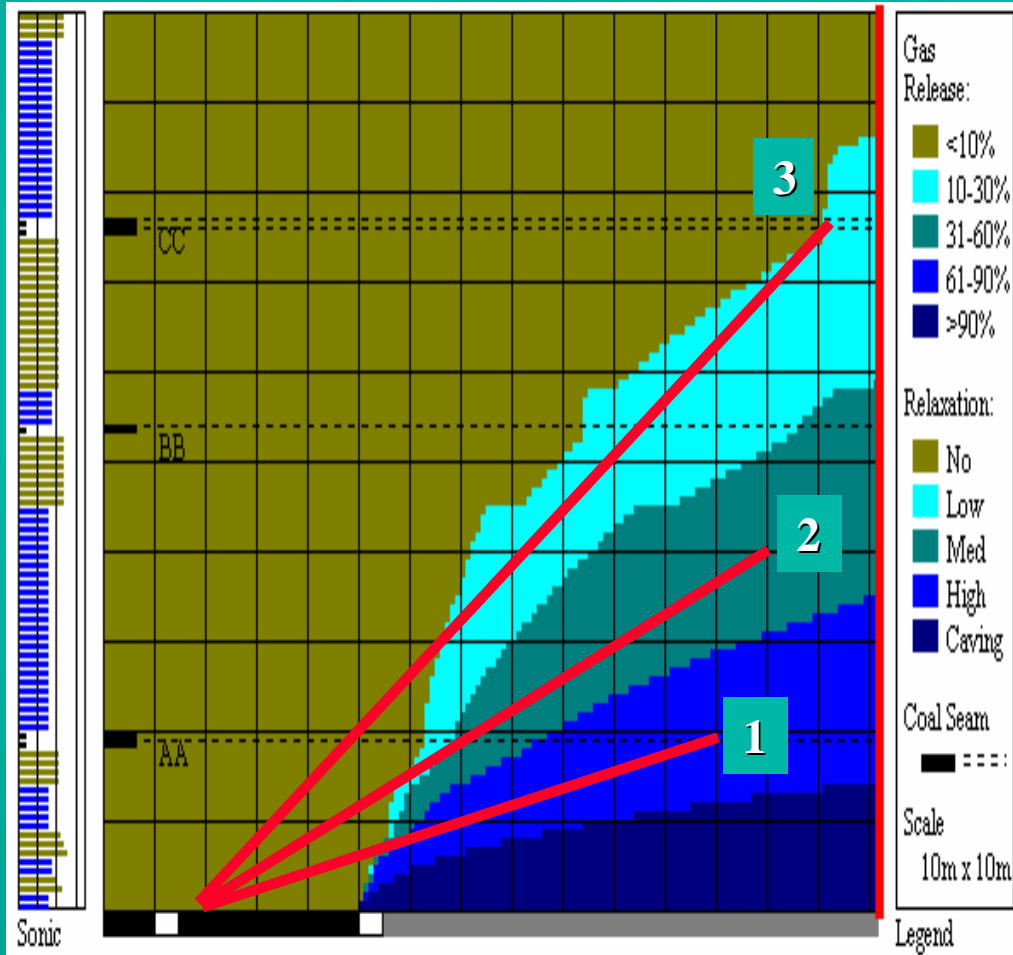
- ◆ Based on sequential bed separation and rock strata curvature enforcement principles
- ◆ Output generation:
  - roof strata break-line as a boundary between continuous and discontinuous rock masses
  - five gas release zones with various degassing intensity



# Roofgas simulation & gas drainage up-holes design

100 m behind the face

300 m behind the face

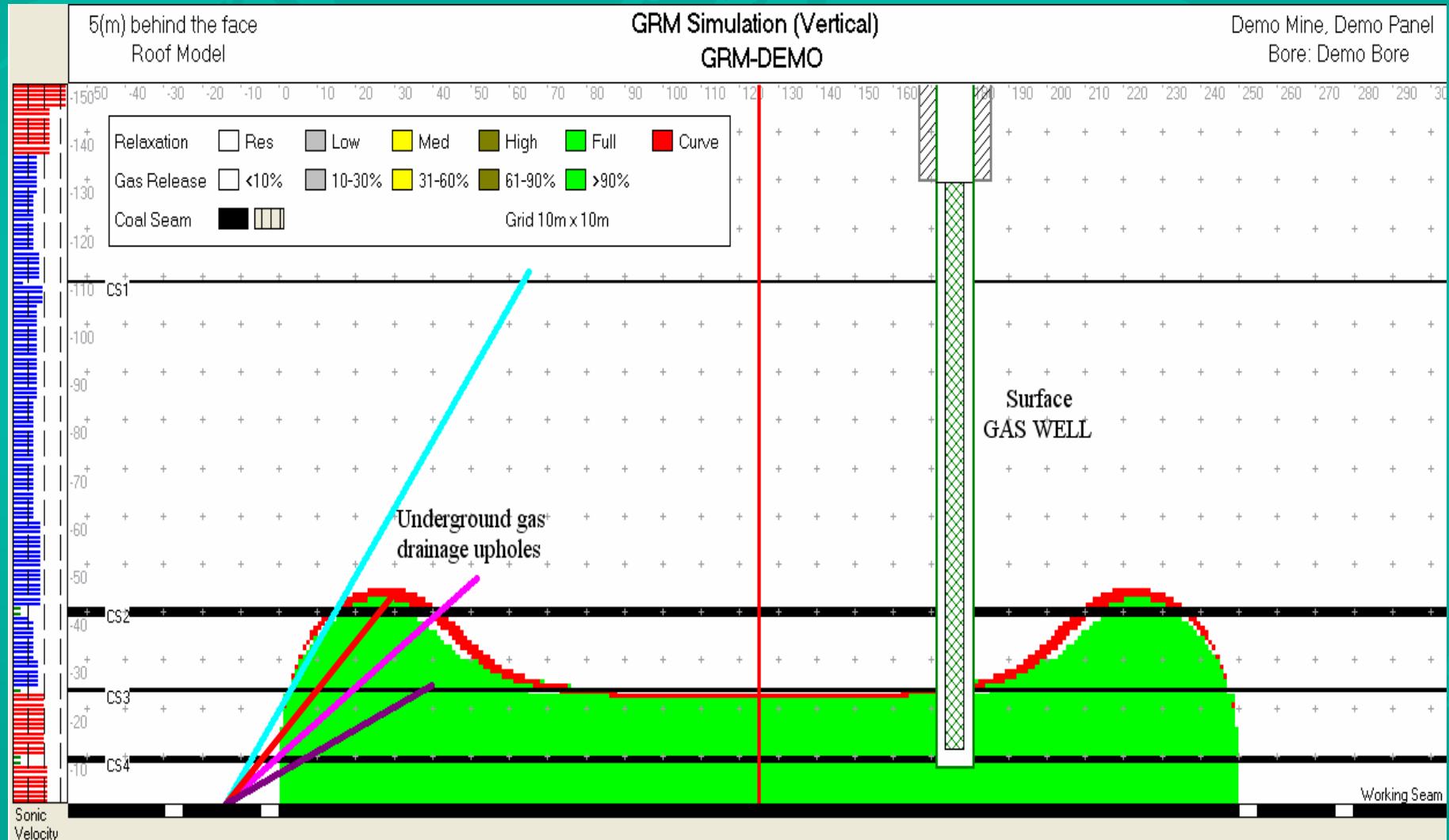


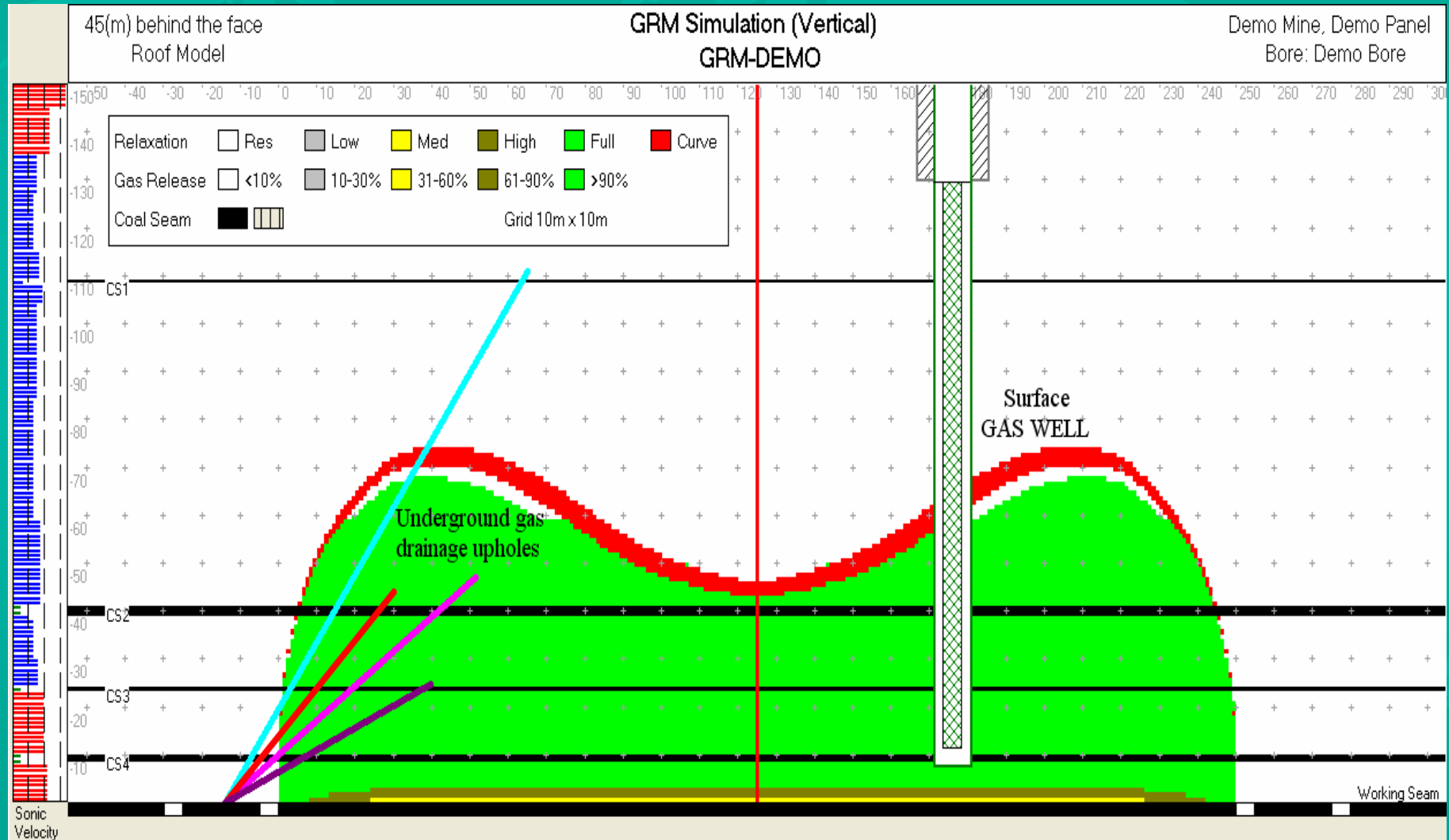




# GRM roof simulation

## 5m behind the face

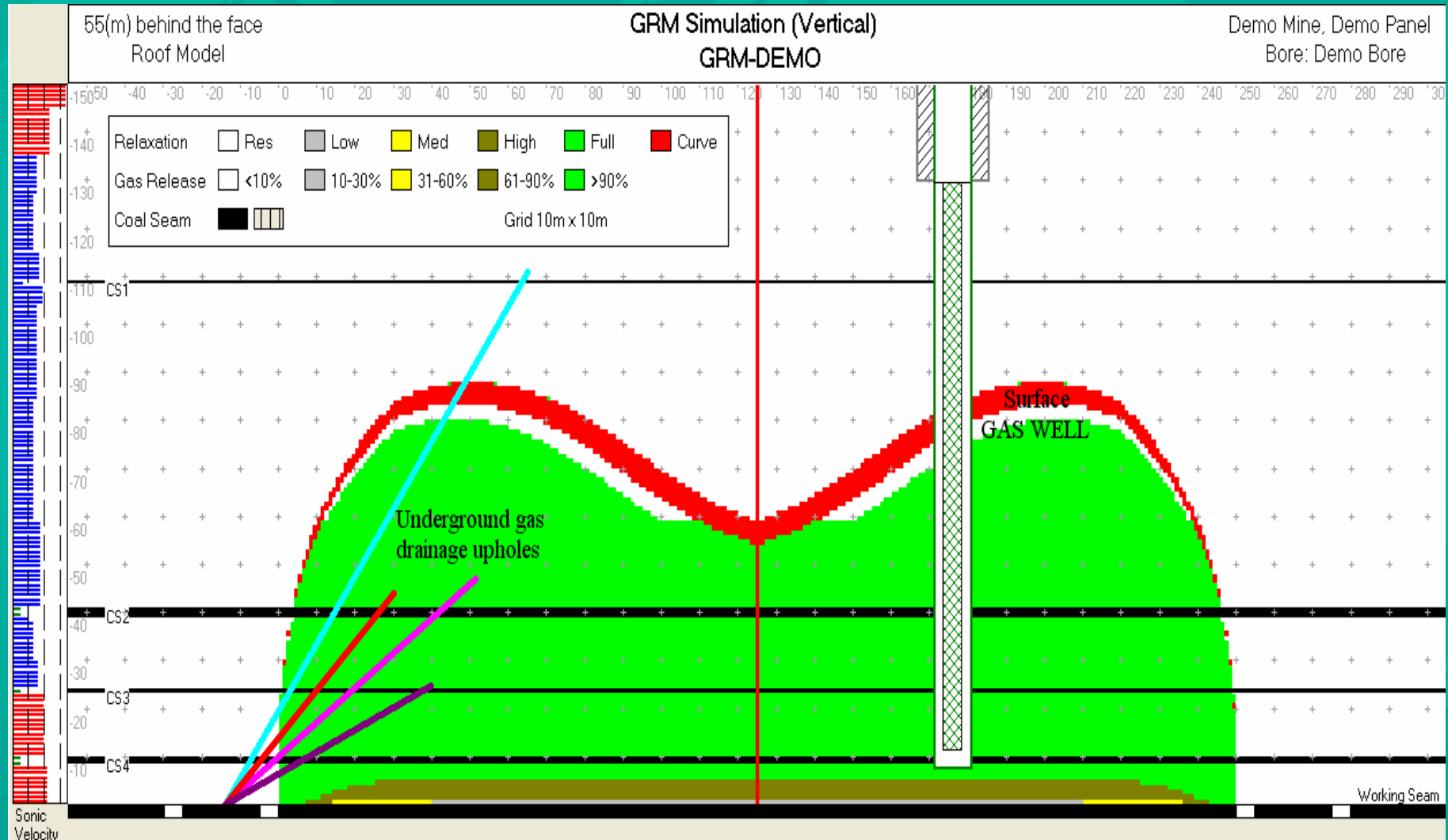


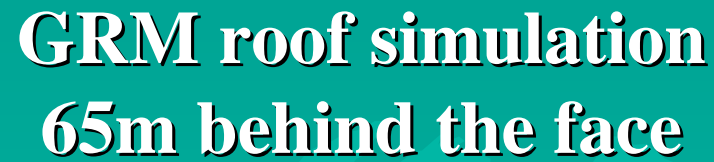




# GRM roof simulation

## 55m behind the face

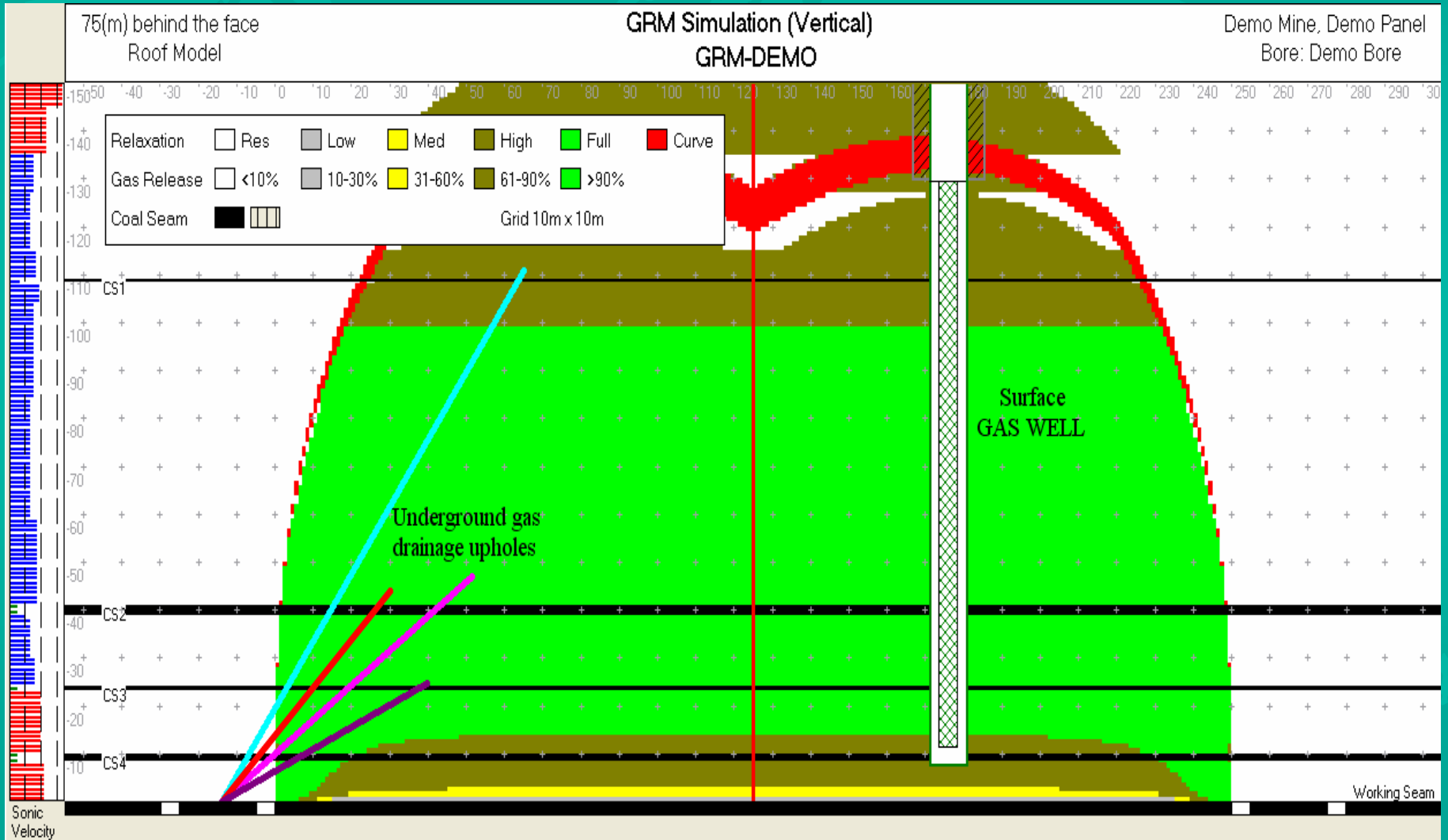






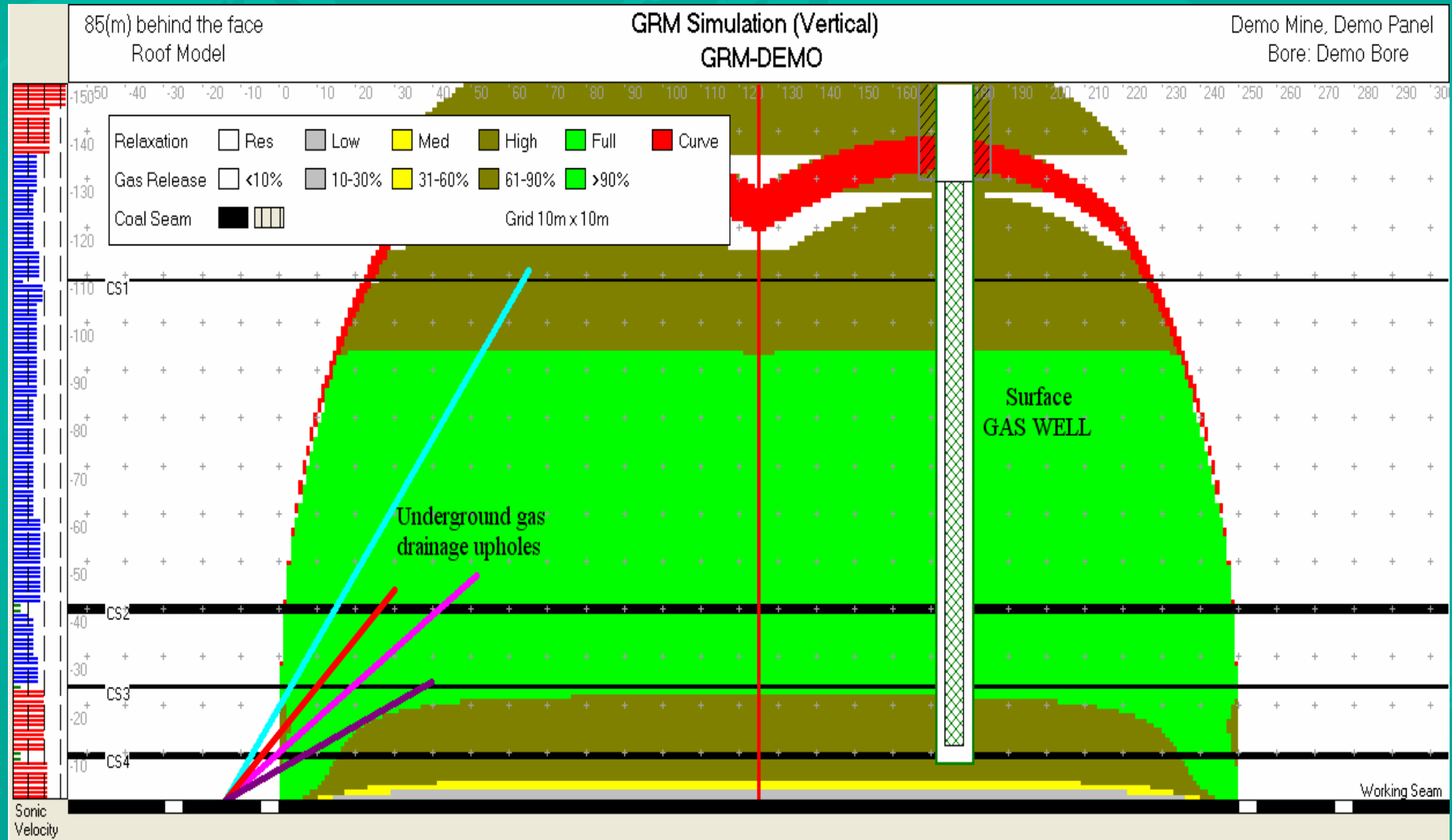
# GRM roof simulation

## 75m behind the face



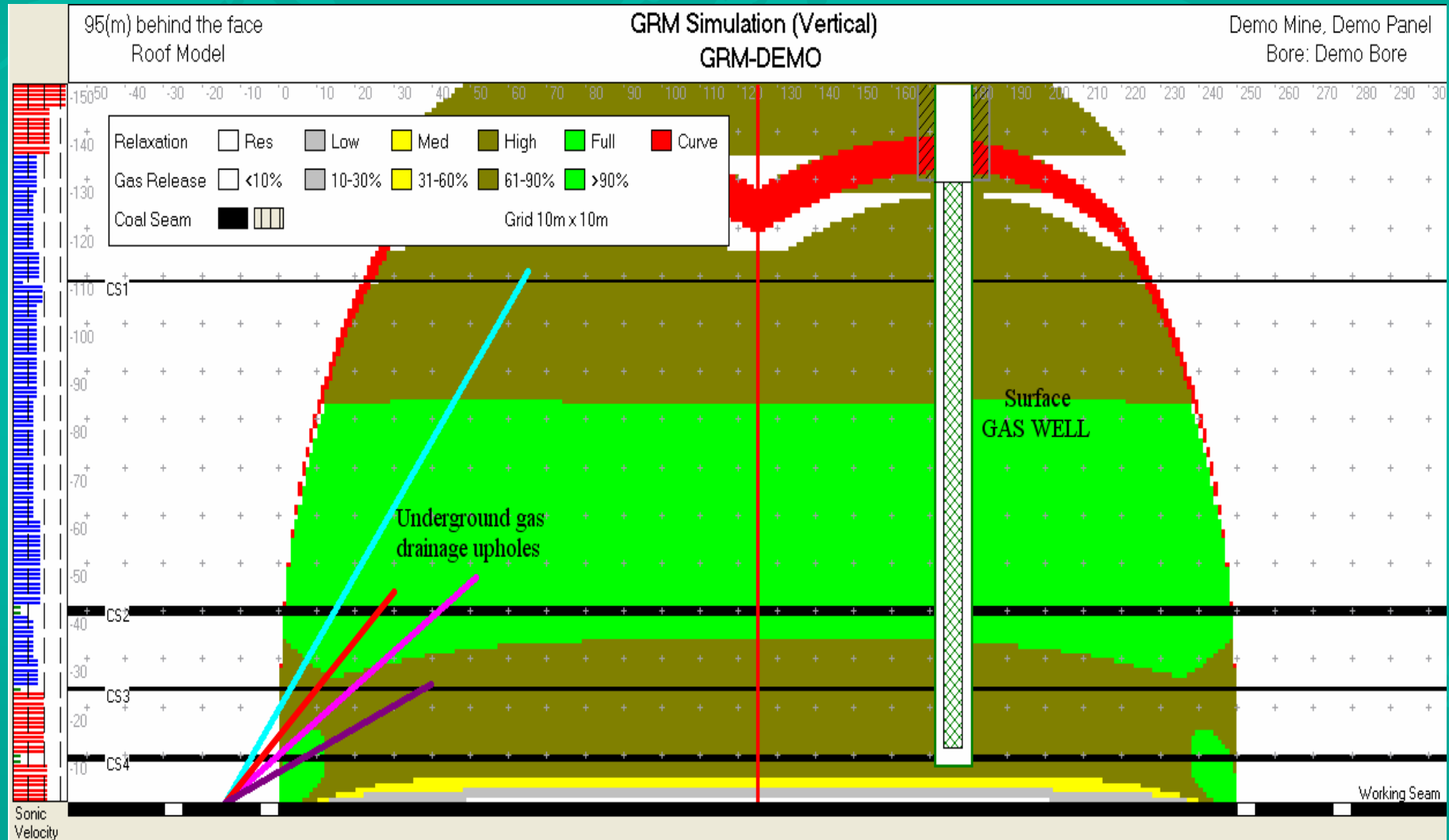


# GRM roof simulation 85m behind the face



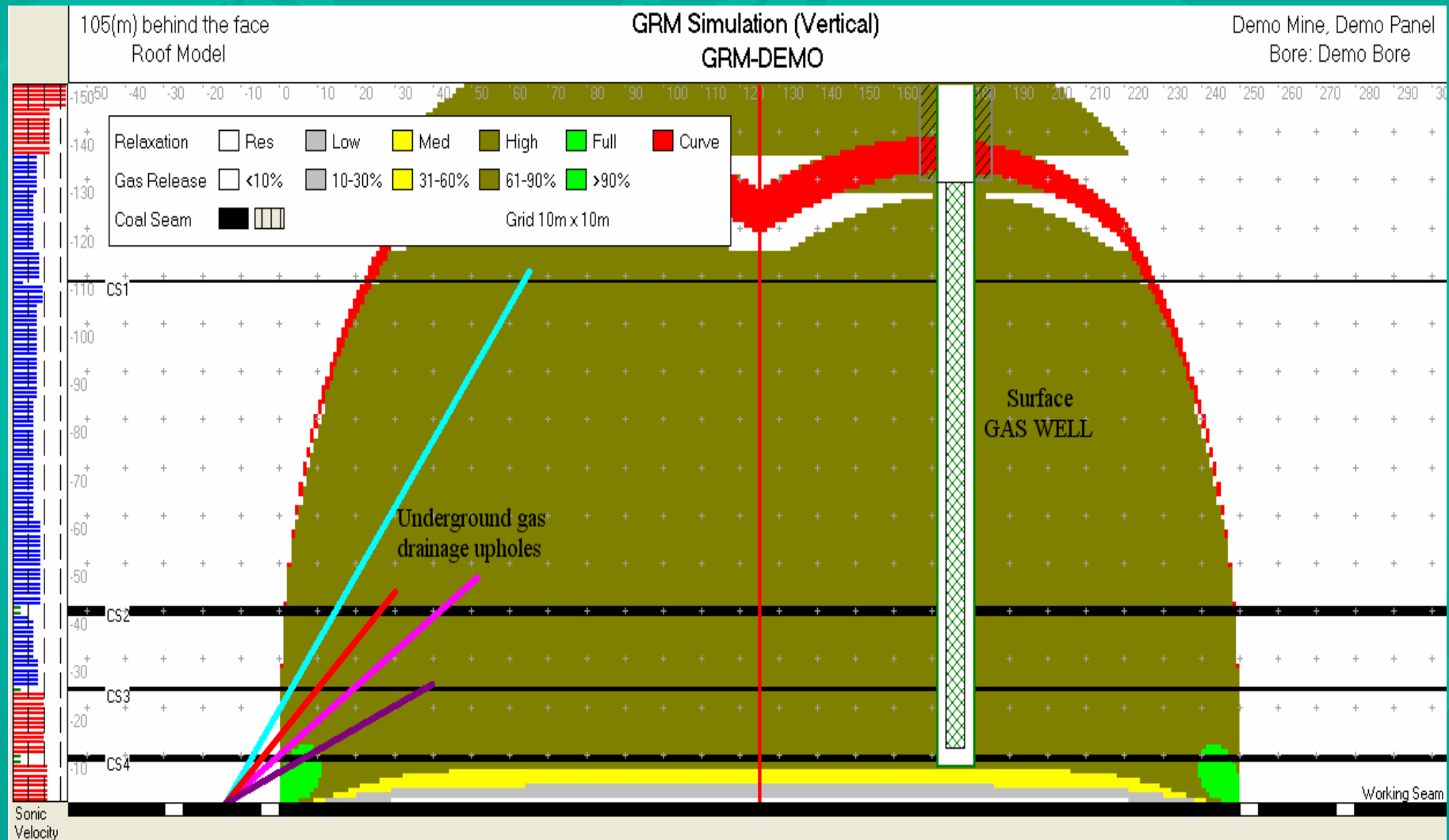


# GRM roof simulation 95m behind the face





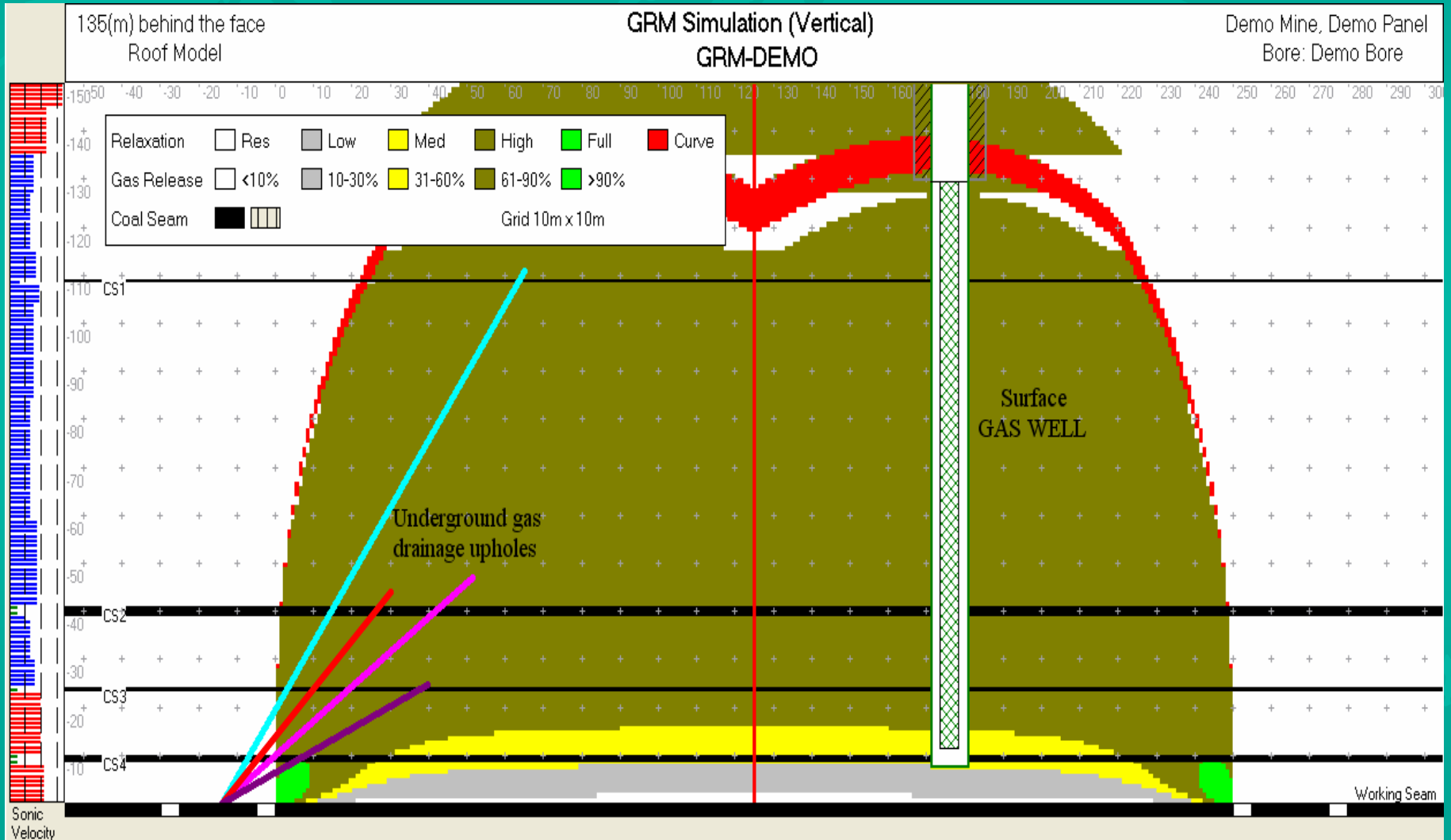
# GRM roof simulation 105m behind the face





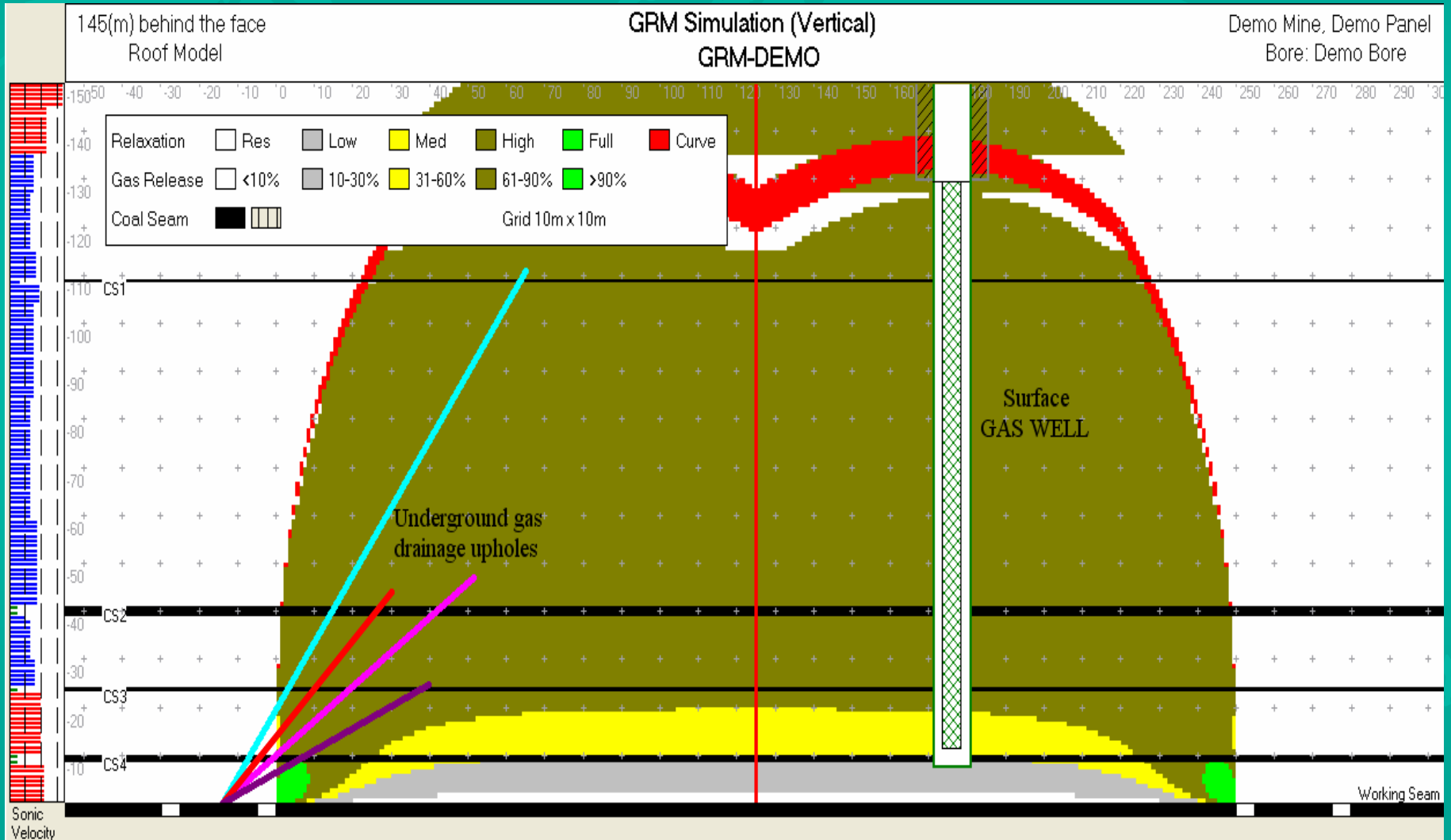


# GRM roof simulation 135m behind the face





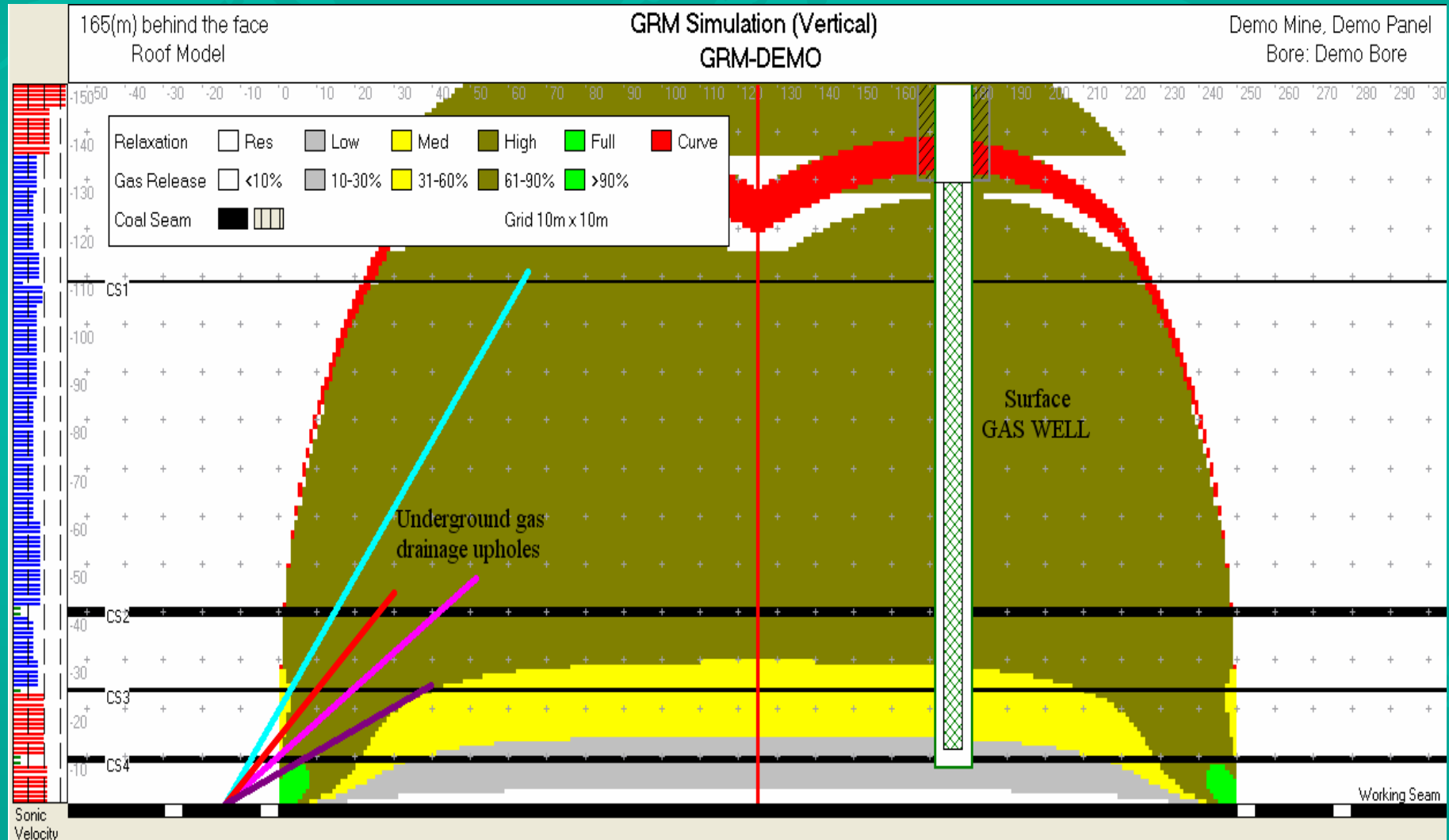
# GRM roof simulation 145m behind the face





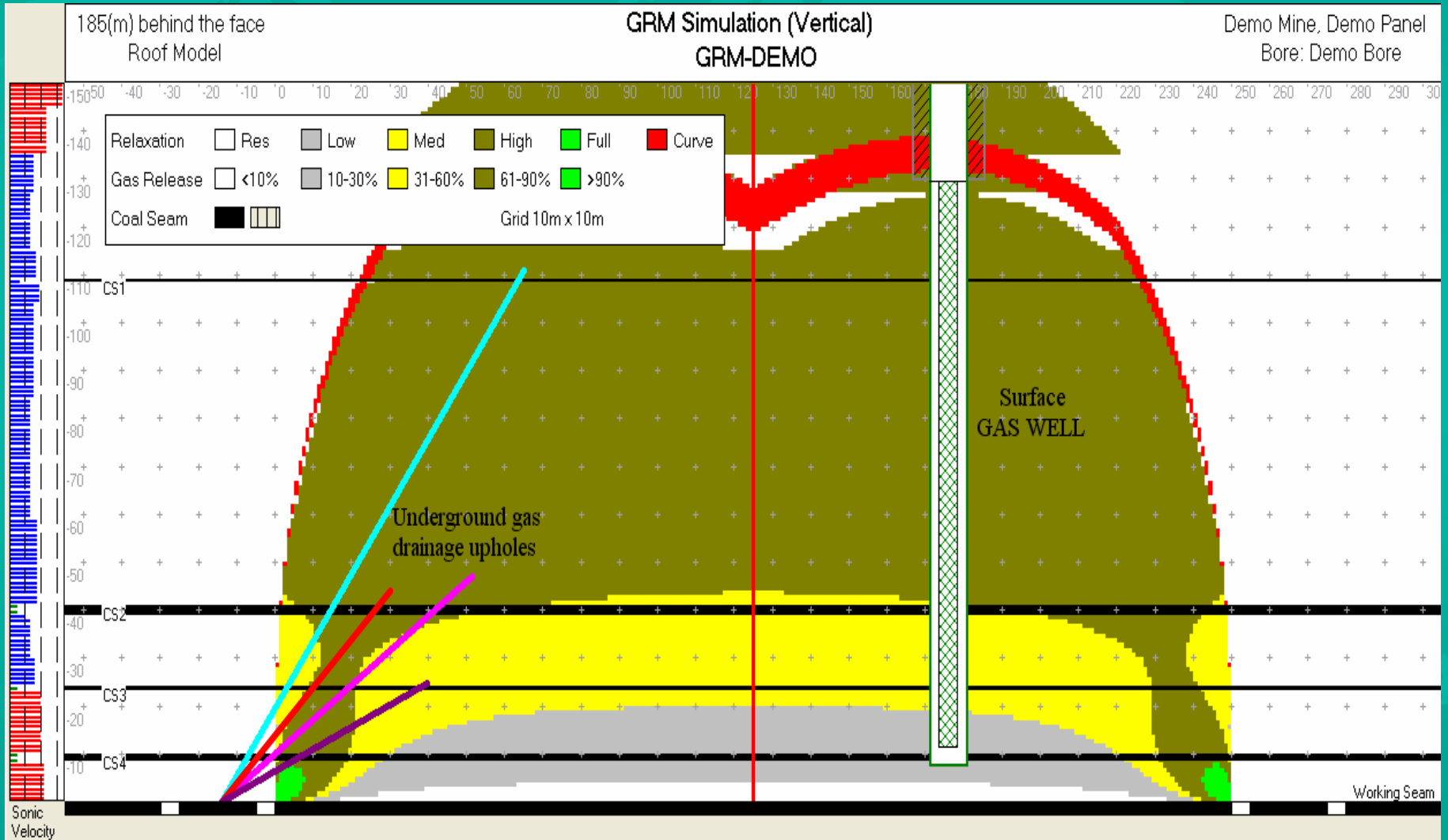
# GRM roof simulation

## 165m behind the face



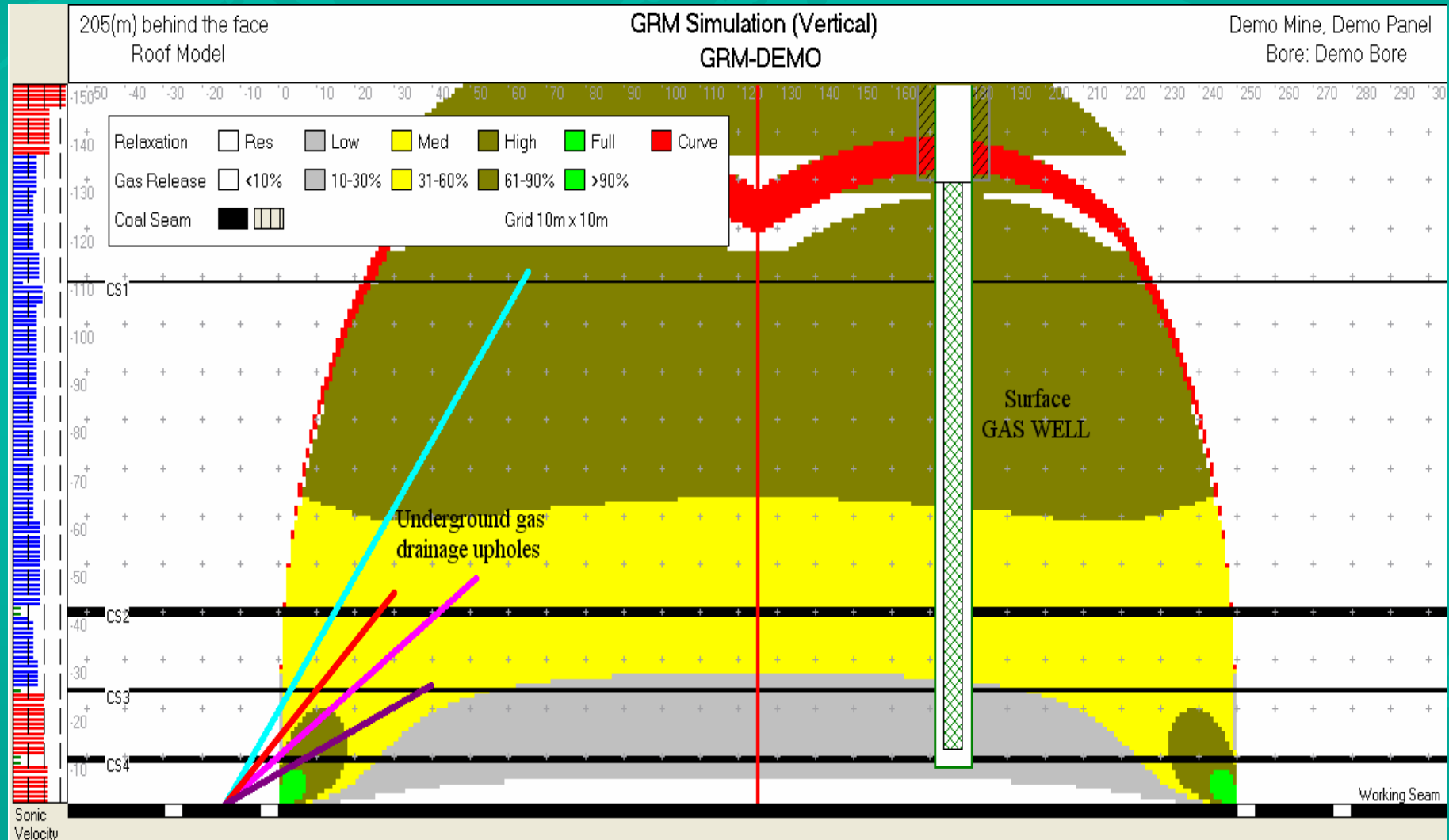


# GRM roof simulation 185m behind the face



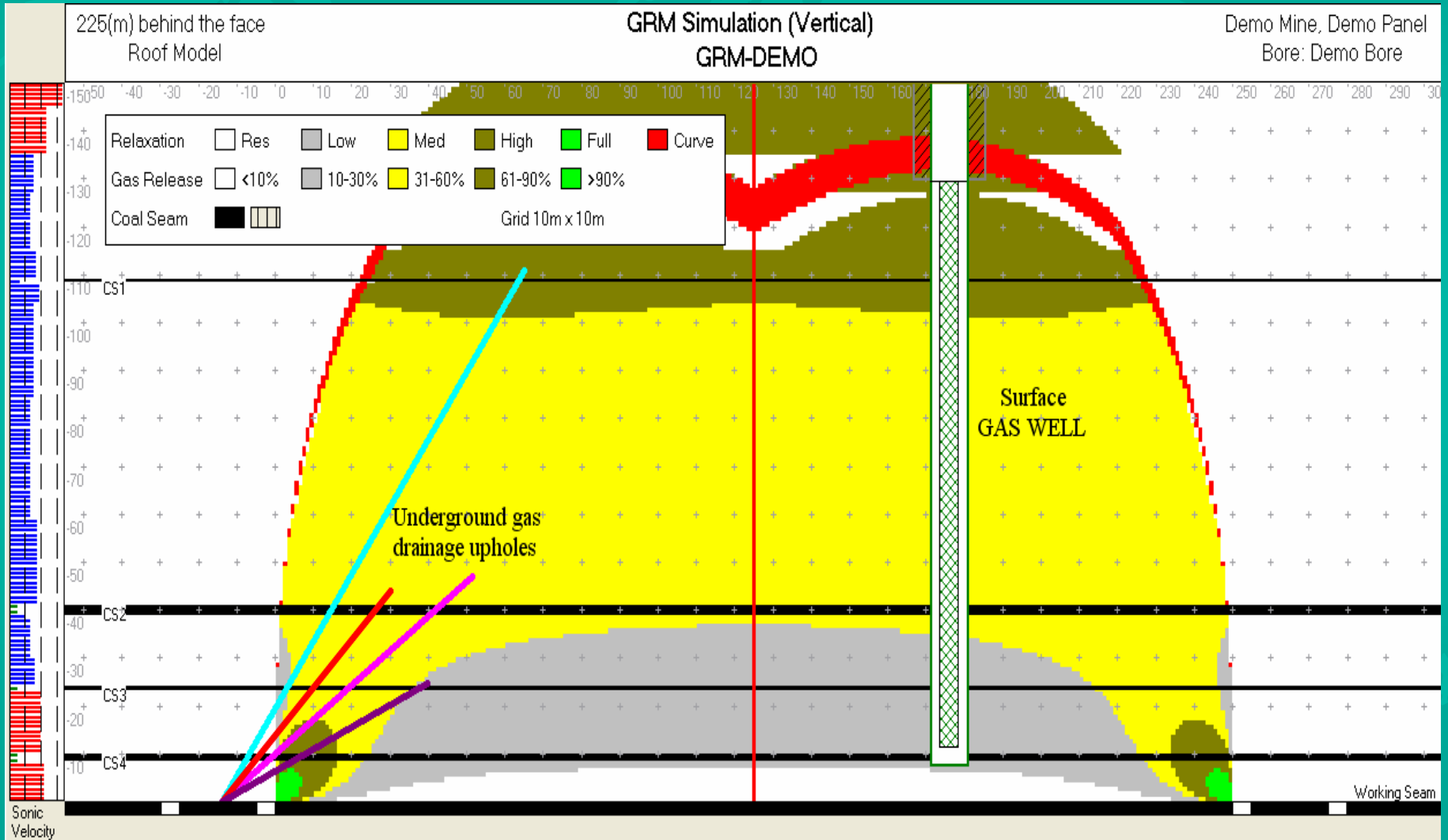


# GRM roof simulation 205m behind the face



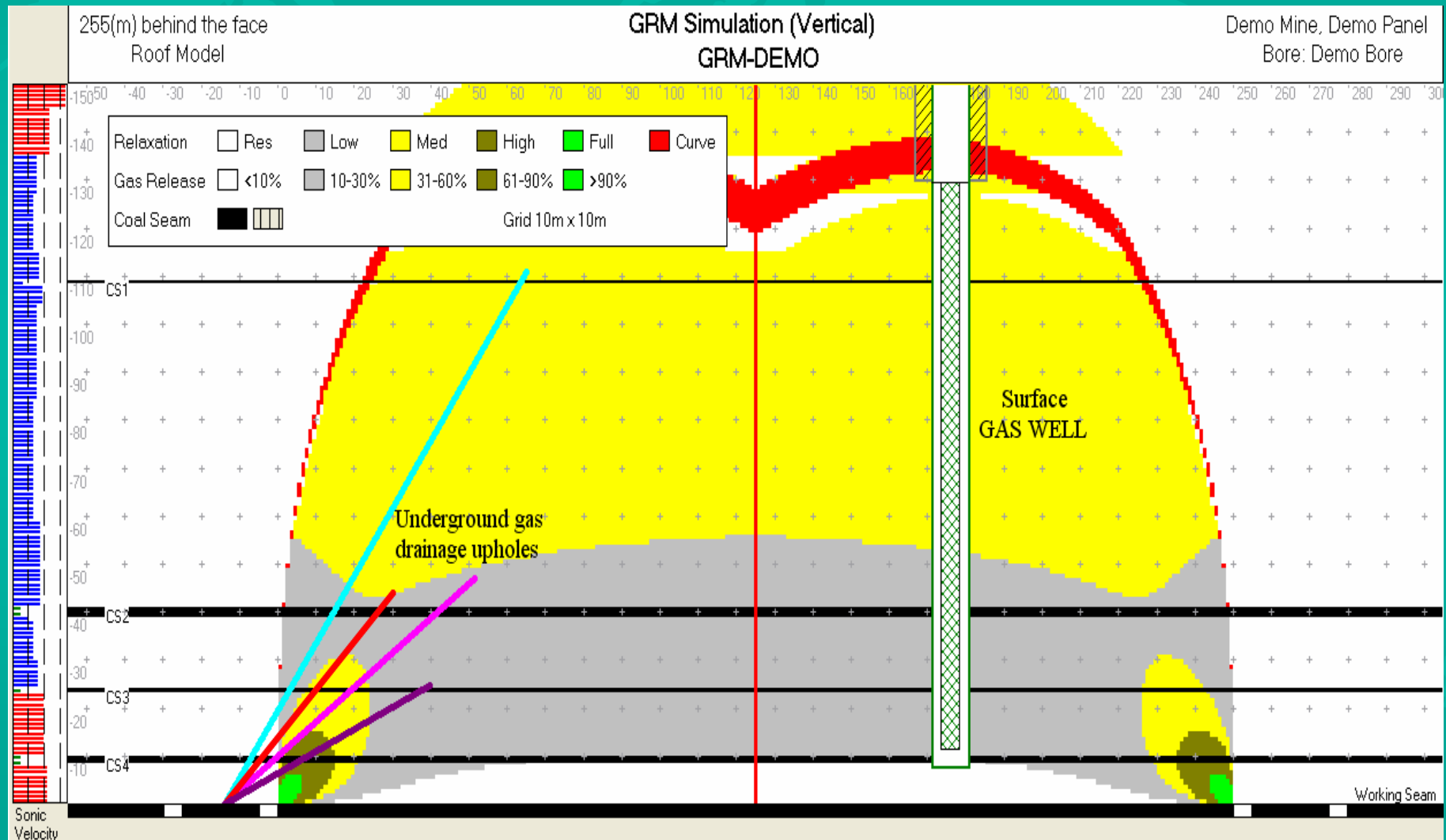


# GRM roof simulation 225m behind the face



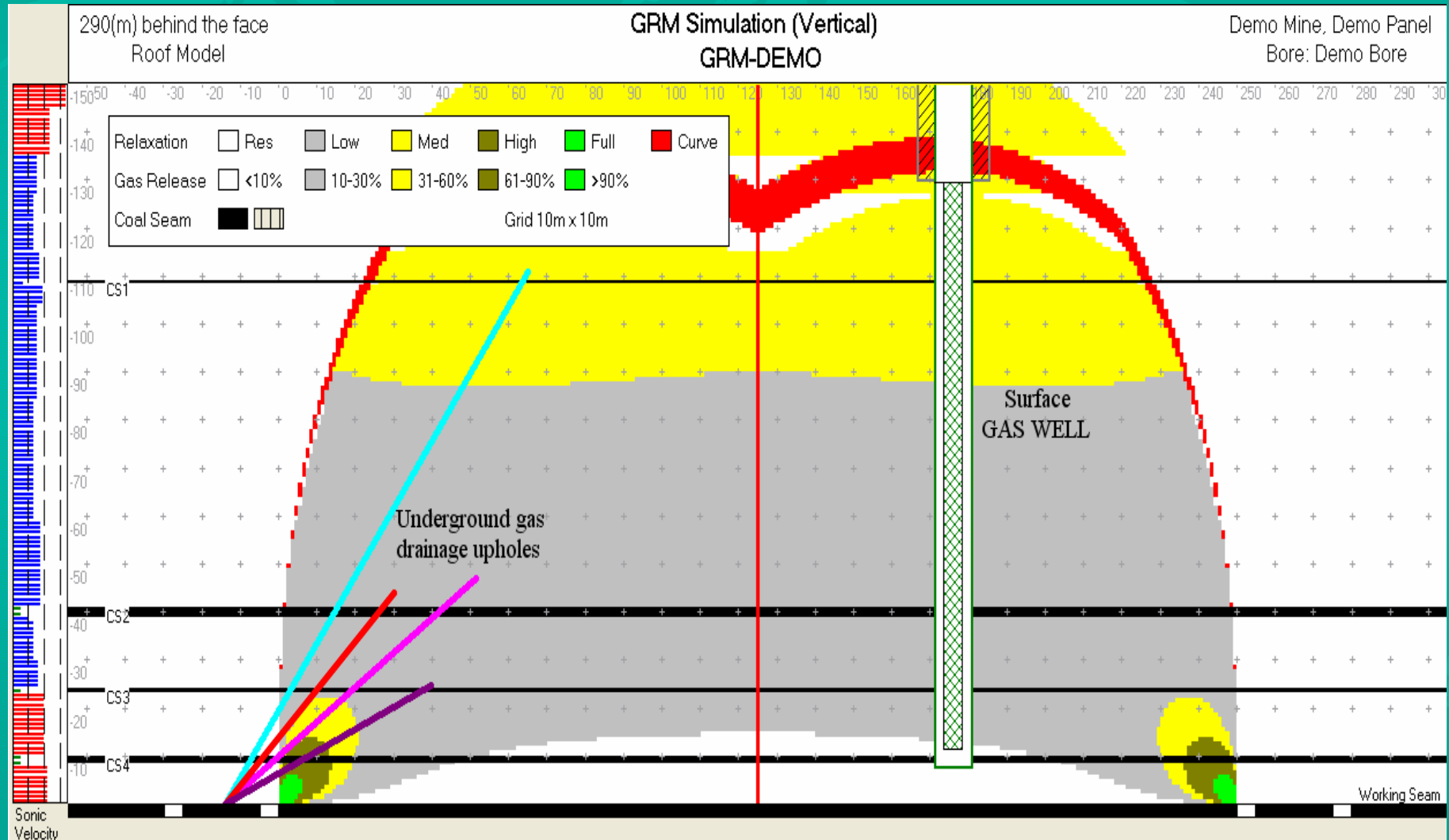


# GRM roof simulation 255m behind the face

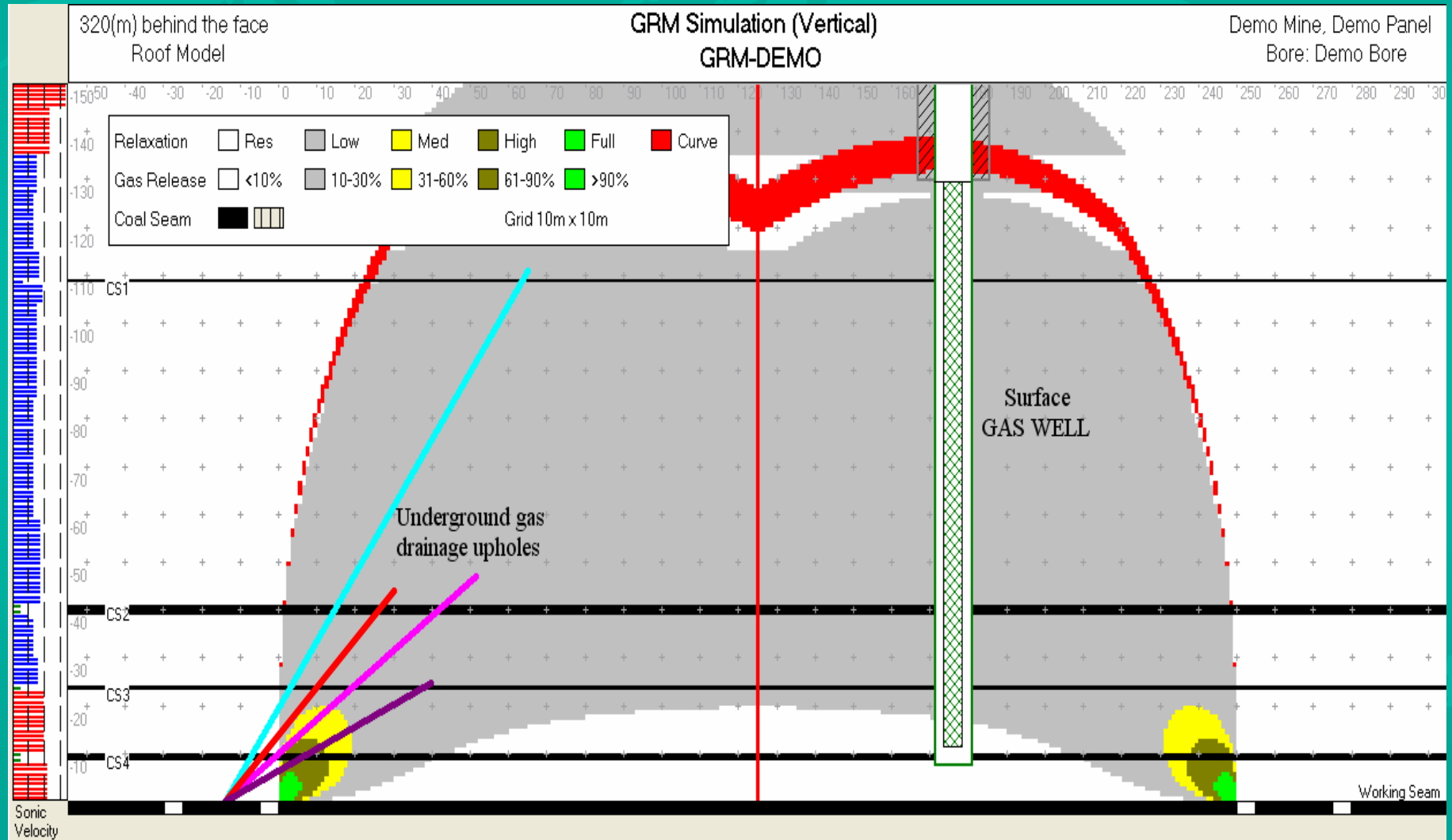


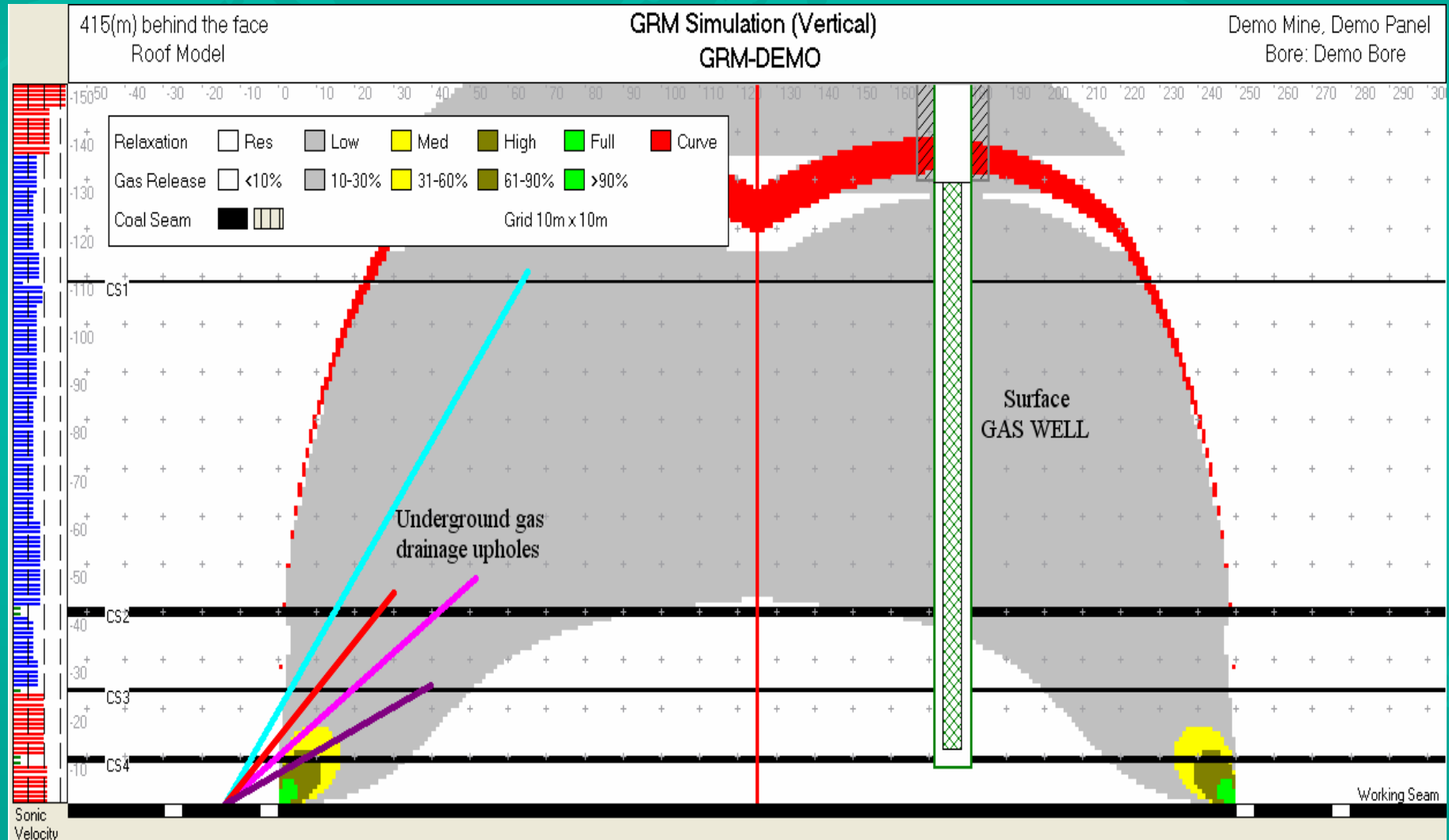


# GRM roof simulation 290m behind the face



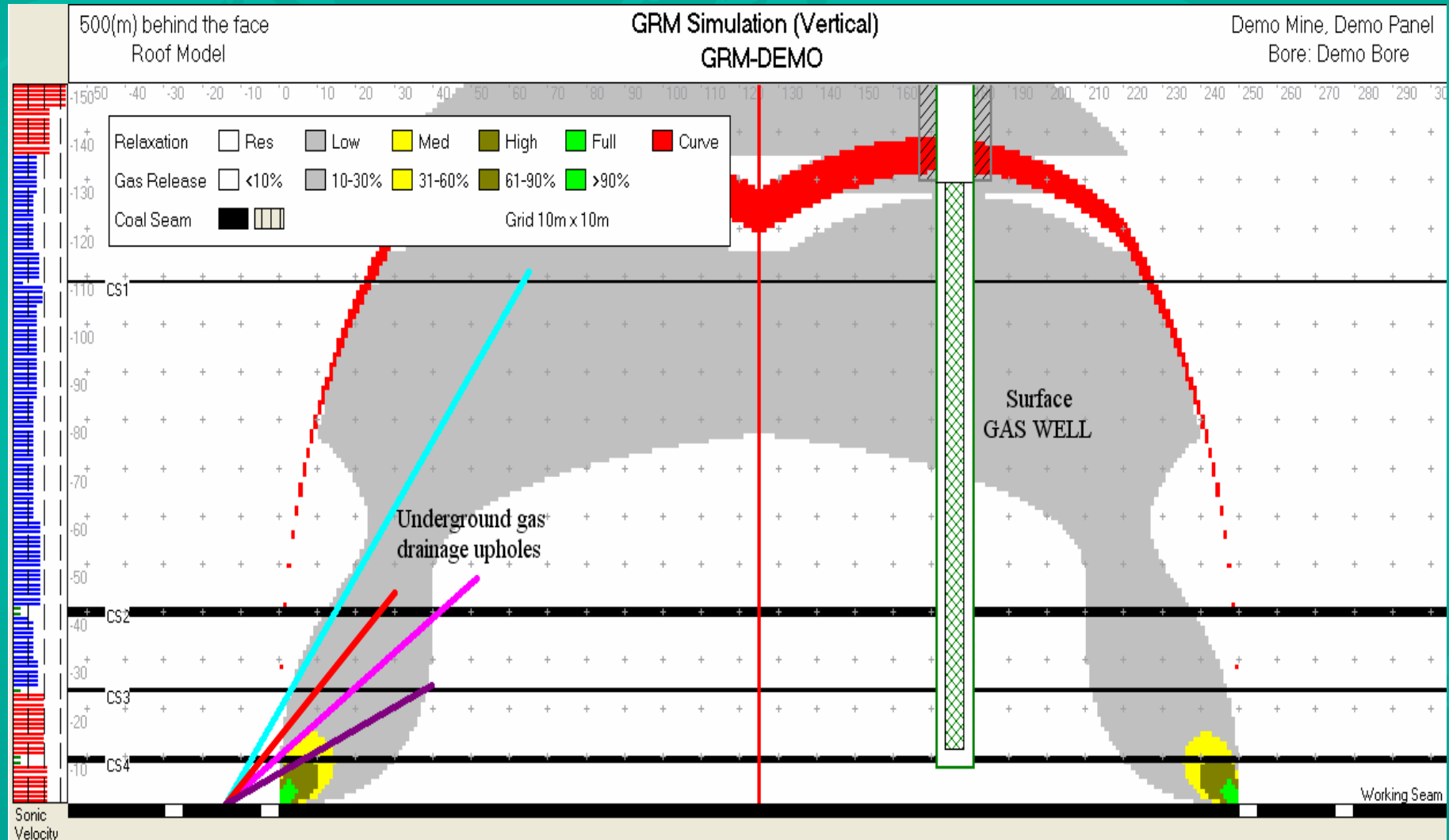


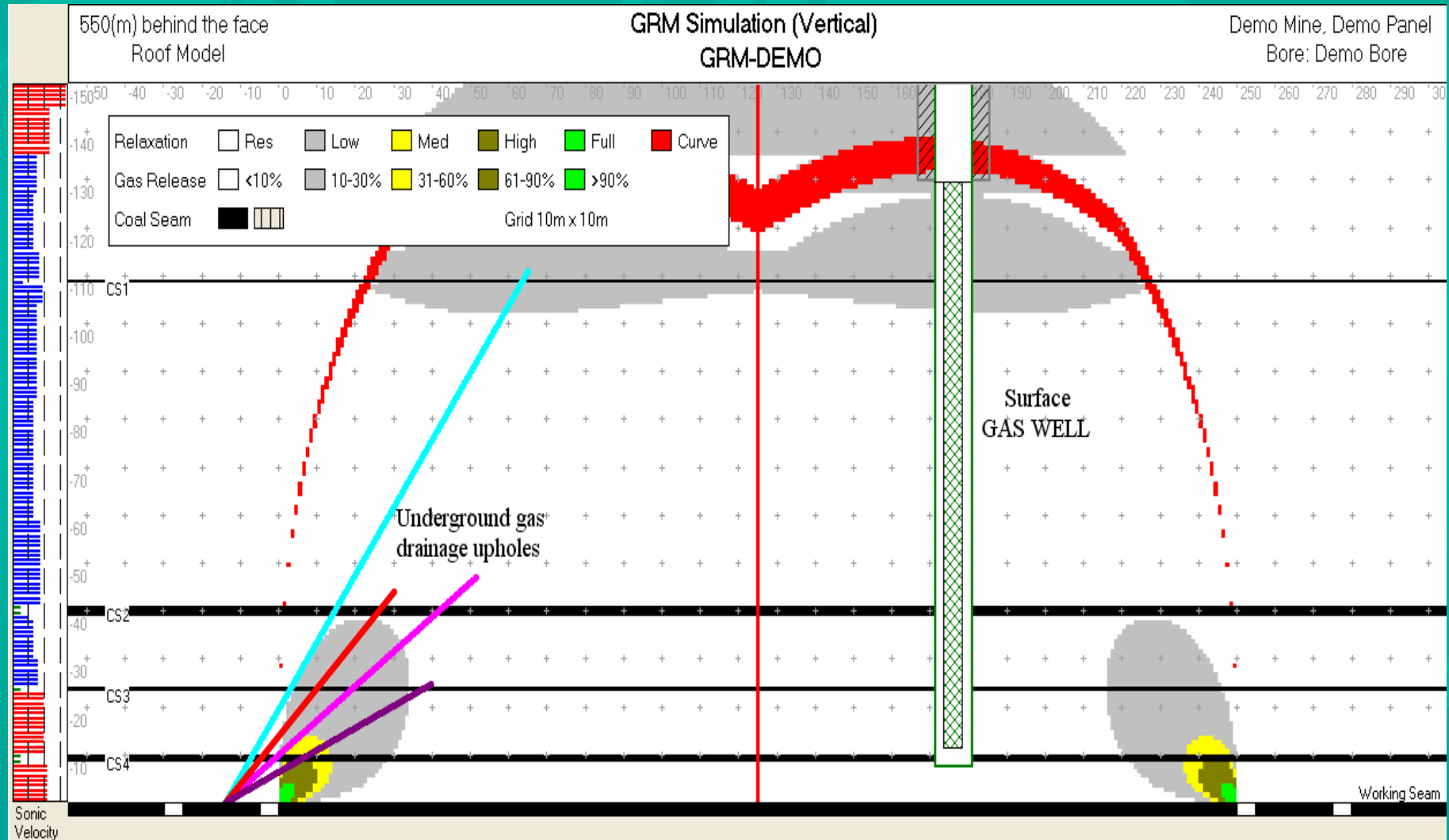






# GRM roof simulation 500m behind the face

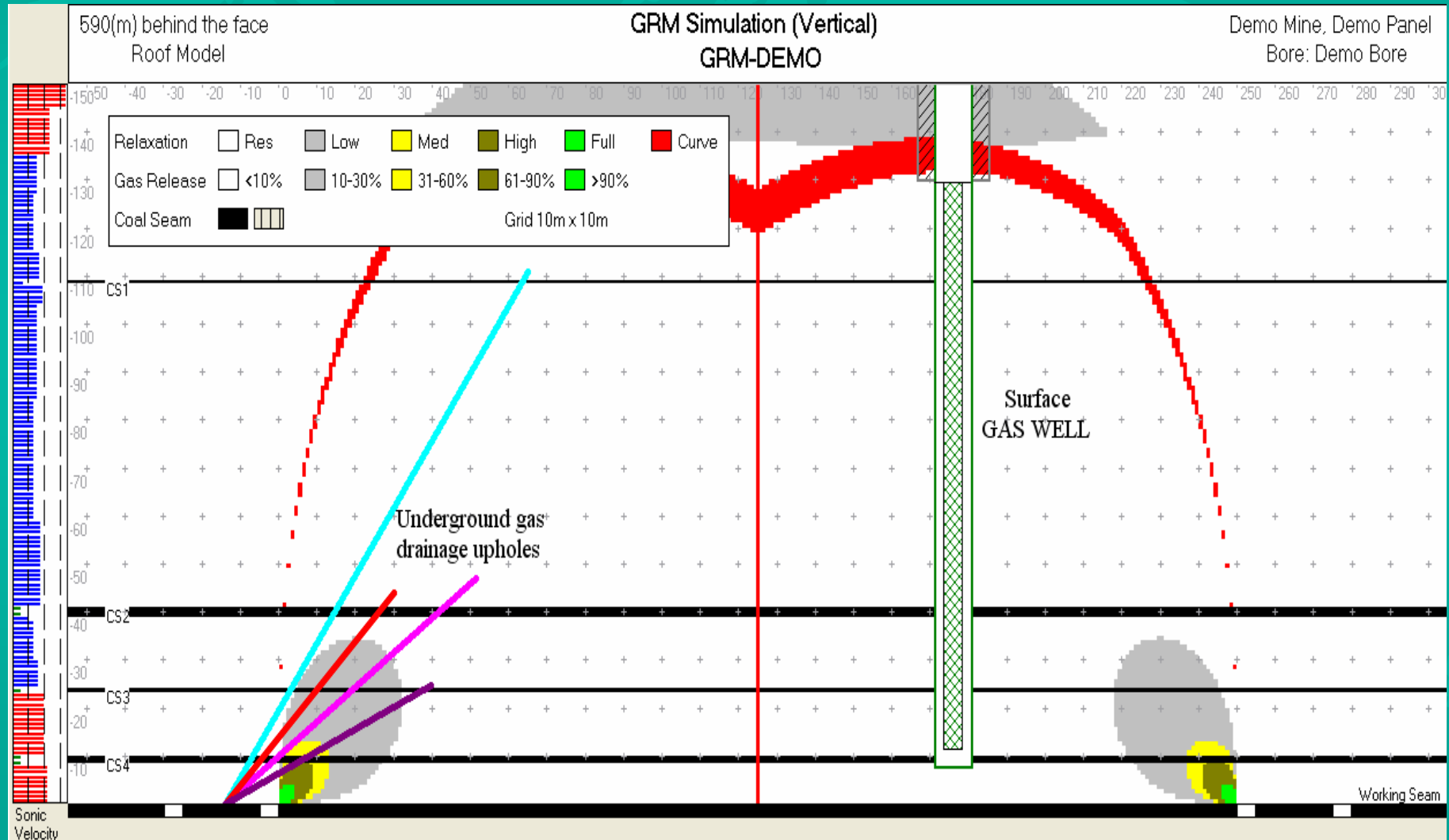






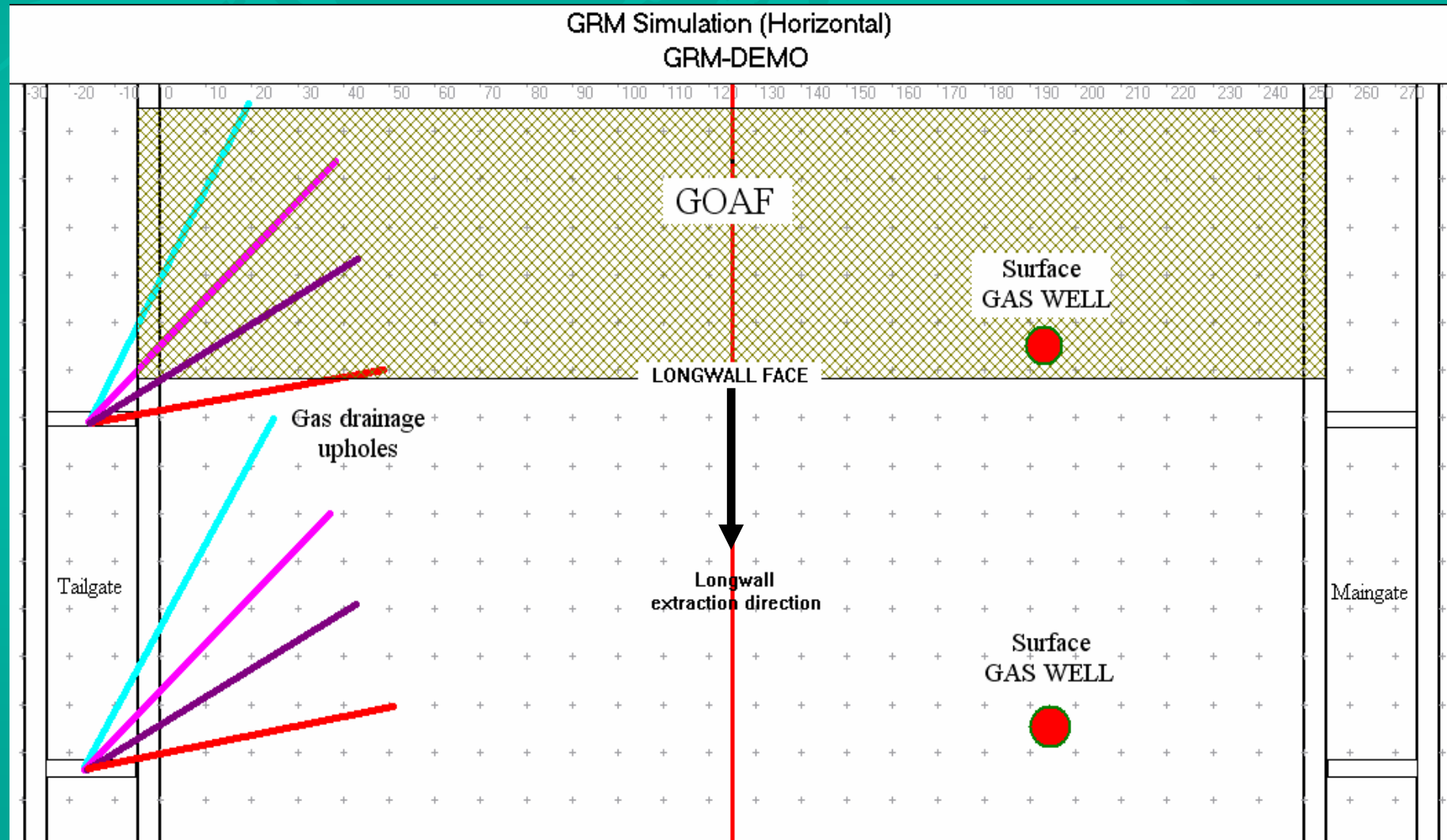
# GRM roof simulation

## 590m behind the face





# GRM roof simulation - horizontal view





## GRM Floorgas simulation

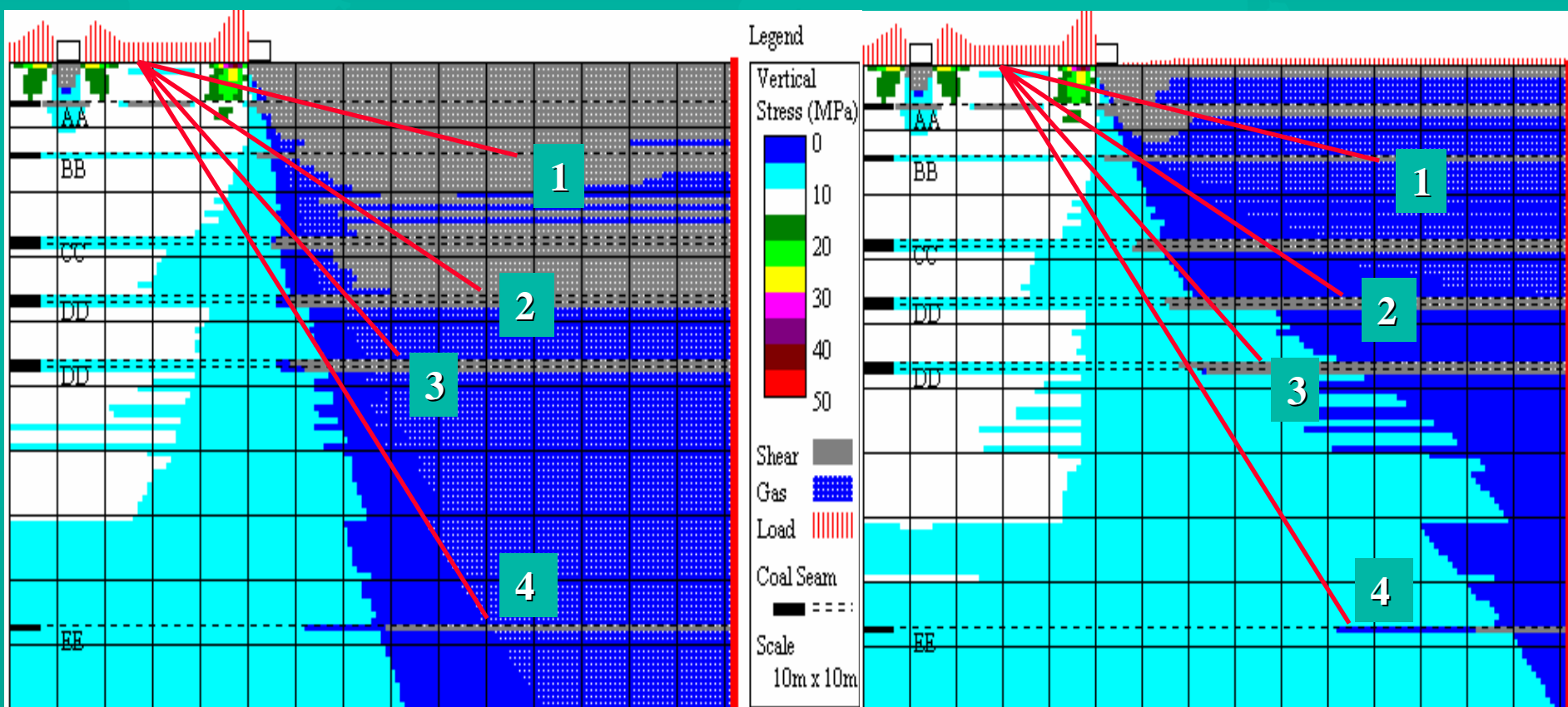
- ◆ Based on boundary element principle
- ◆ Output generation:
  - Five gas release zones with various degassing intensity
  - Vertical load distribution along the chain-pillar and adjacent longwall panel areas
  - Vertical and shear stresses for each cubic metre of rock element being modelled



# Floorgas simulation & gas drainage down-holes design

50 m behind the face

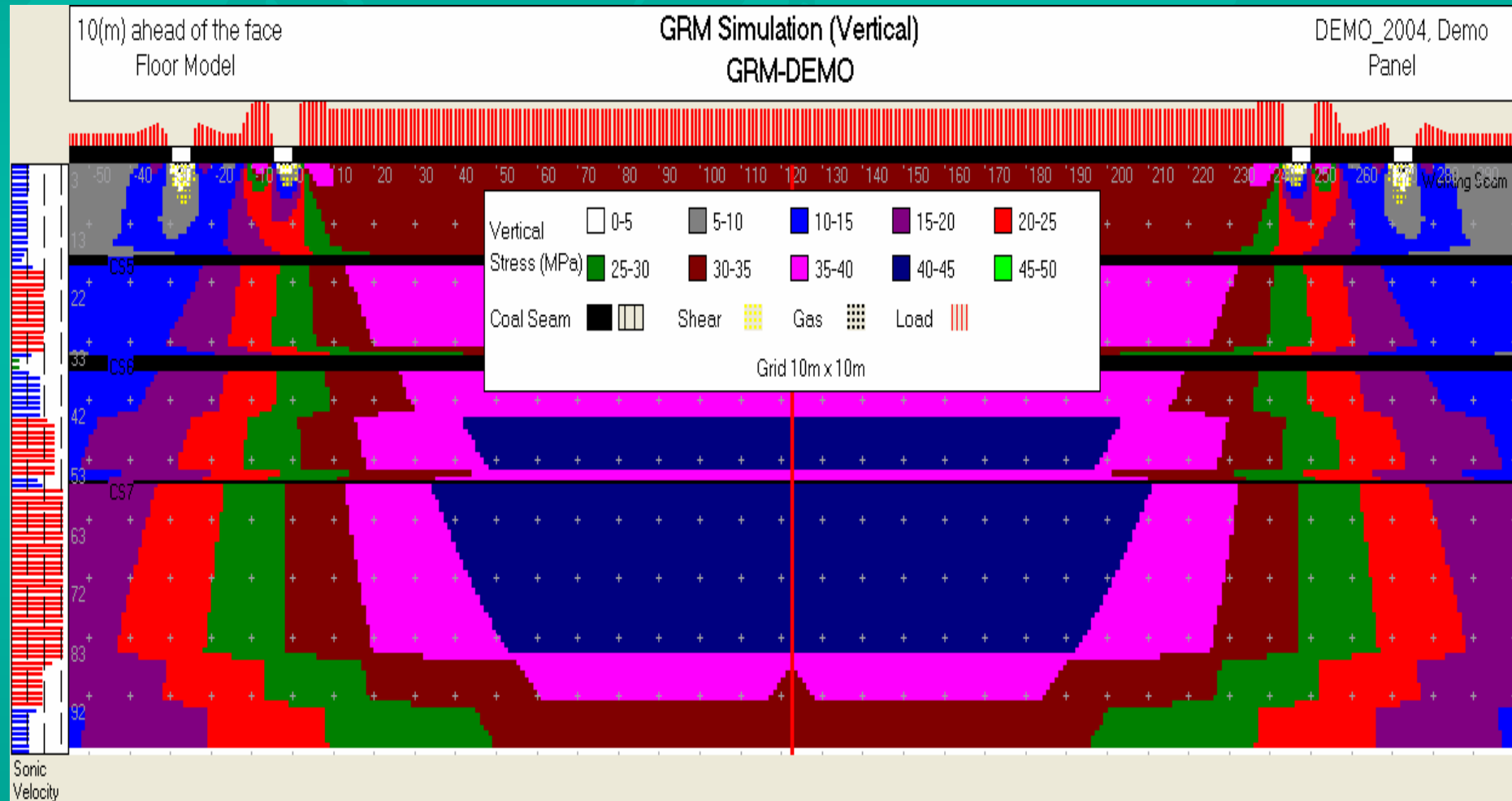
250 m behind the face







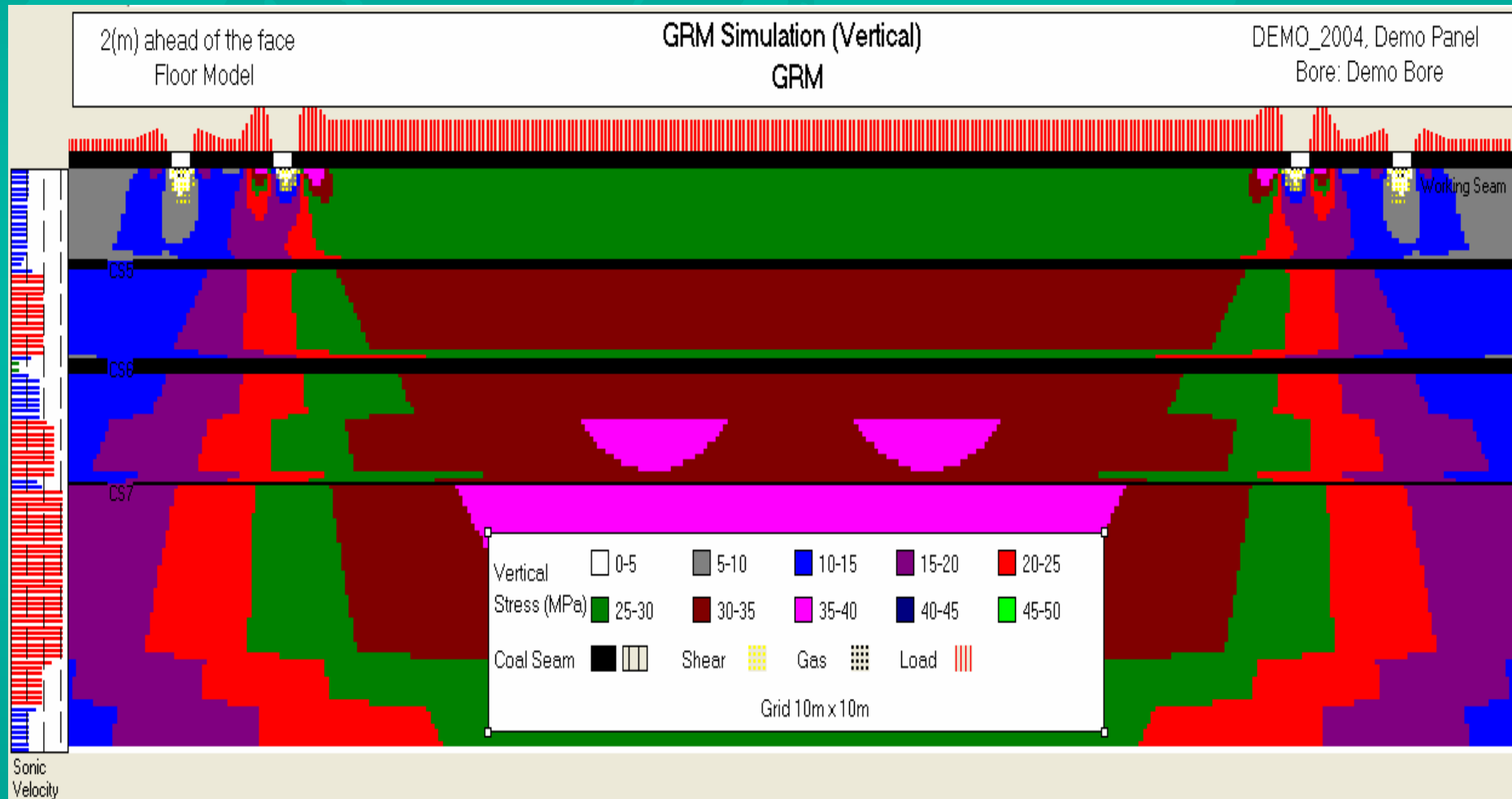
# GRM floor simulation 10m ahead of the face





# GRM floor simulation

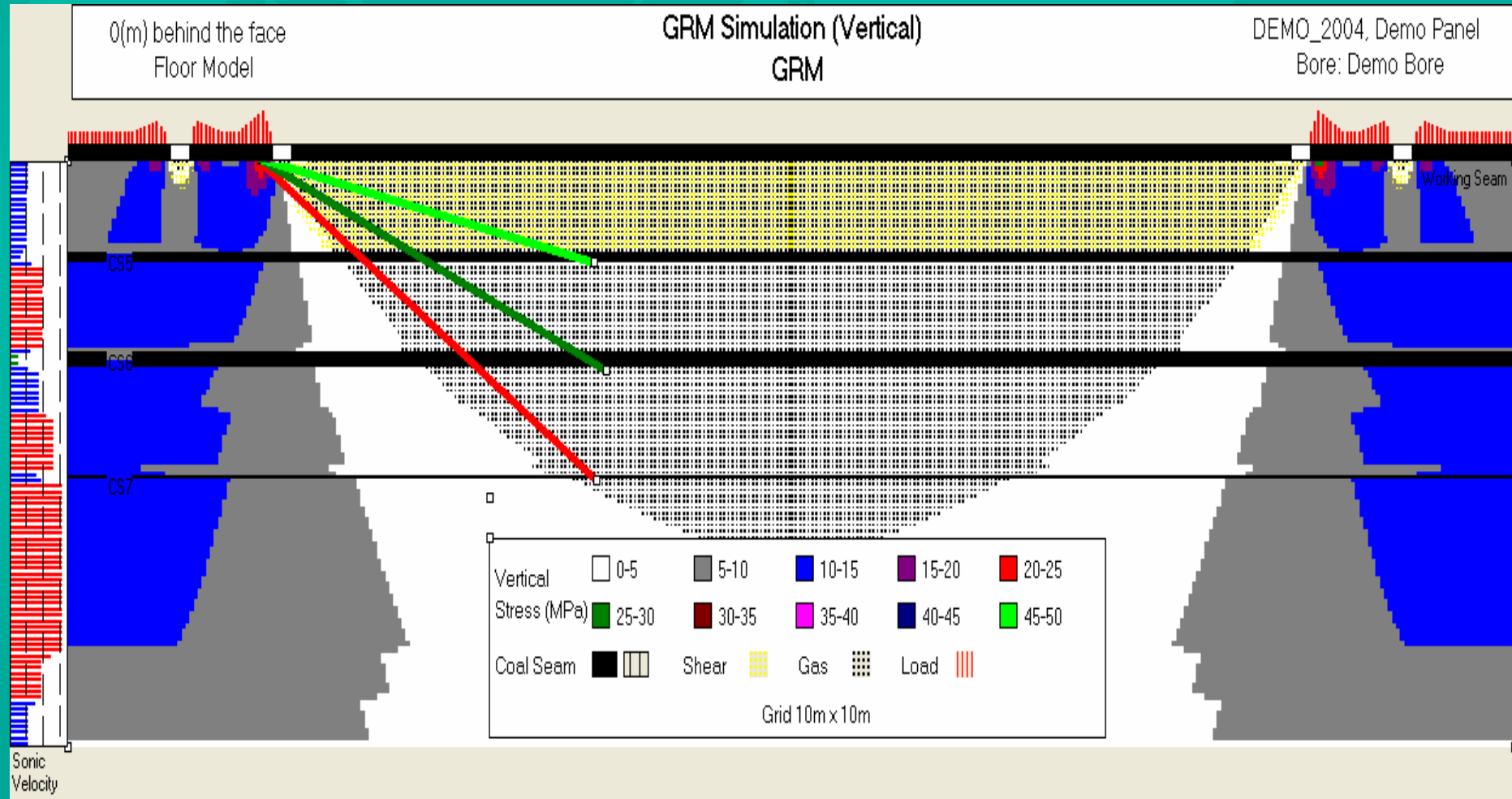
## 2m ahead of the face





# GRM floor simulation

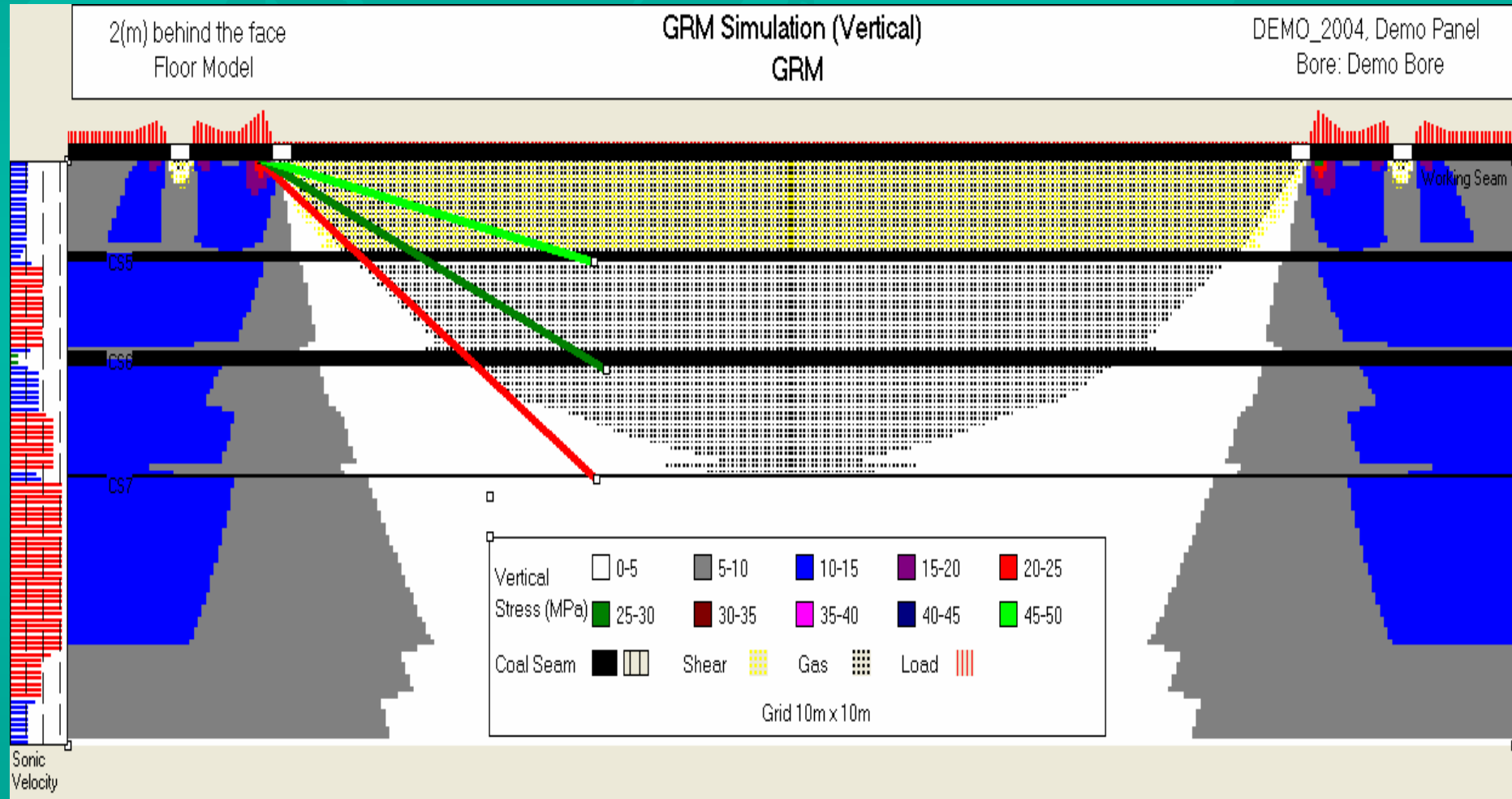
## 0m behind the face





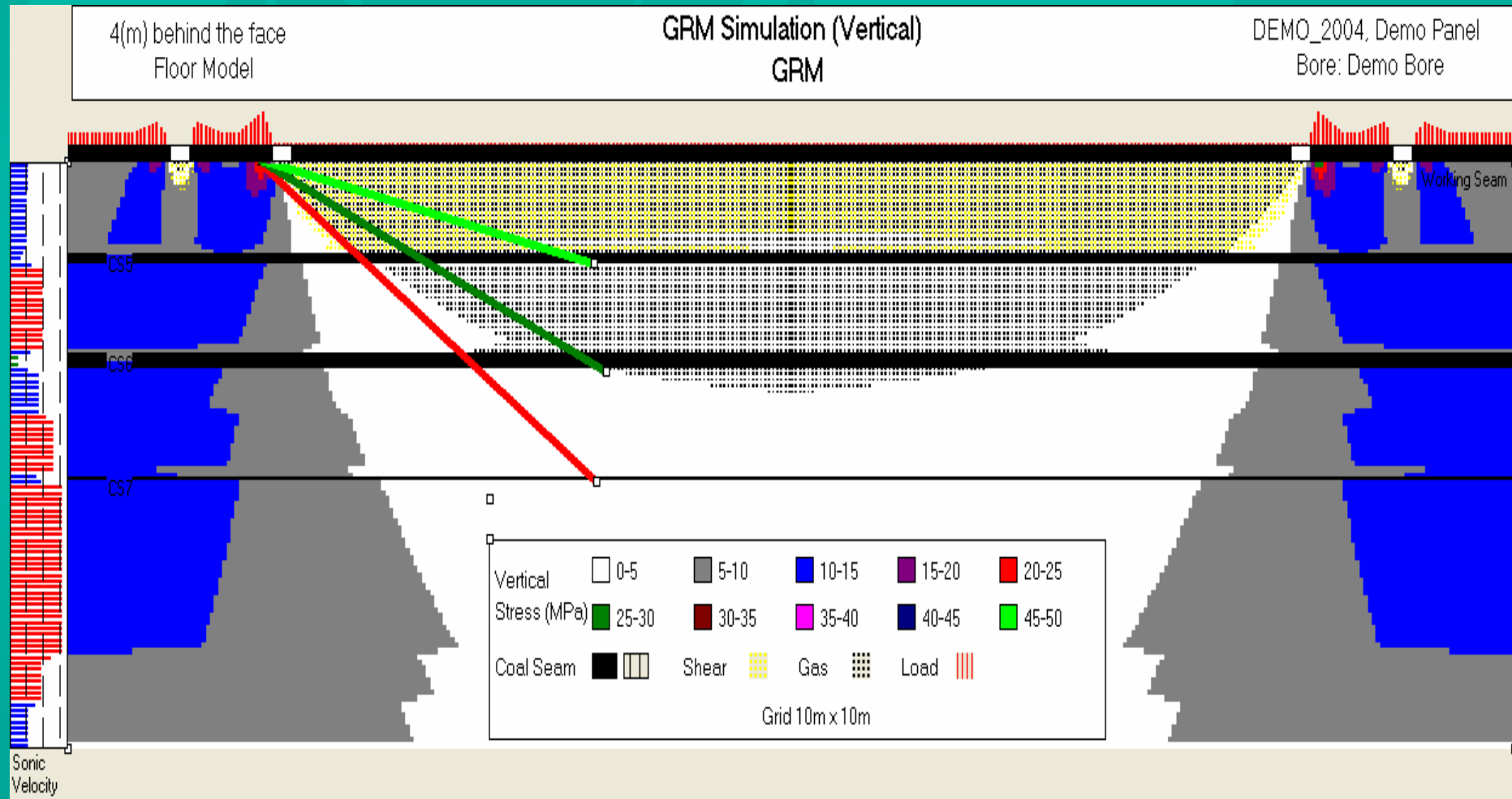
# GRM floor simulation

## 2m behind the face



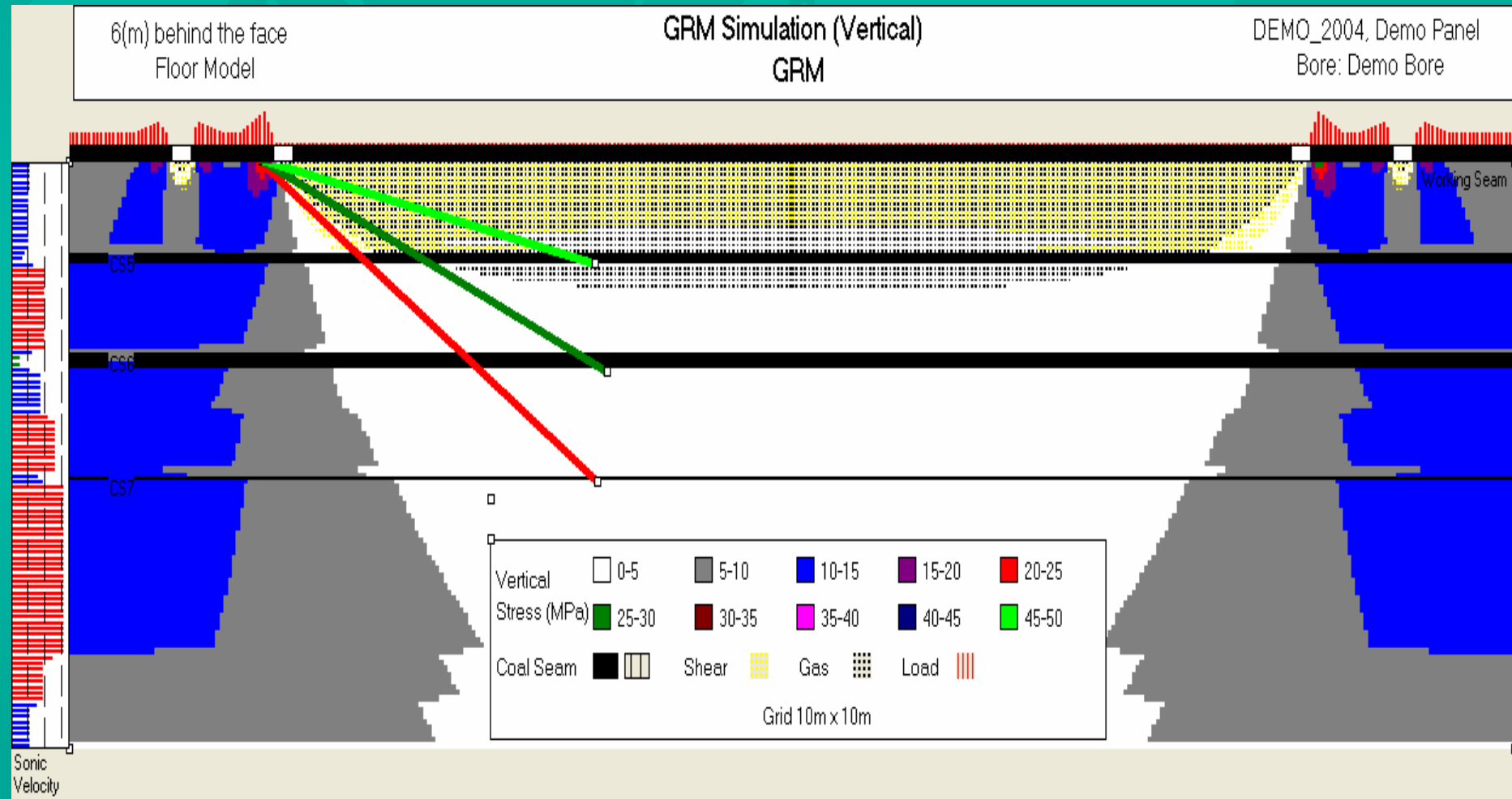


# GRM floor simulation 4m behind the face





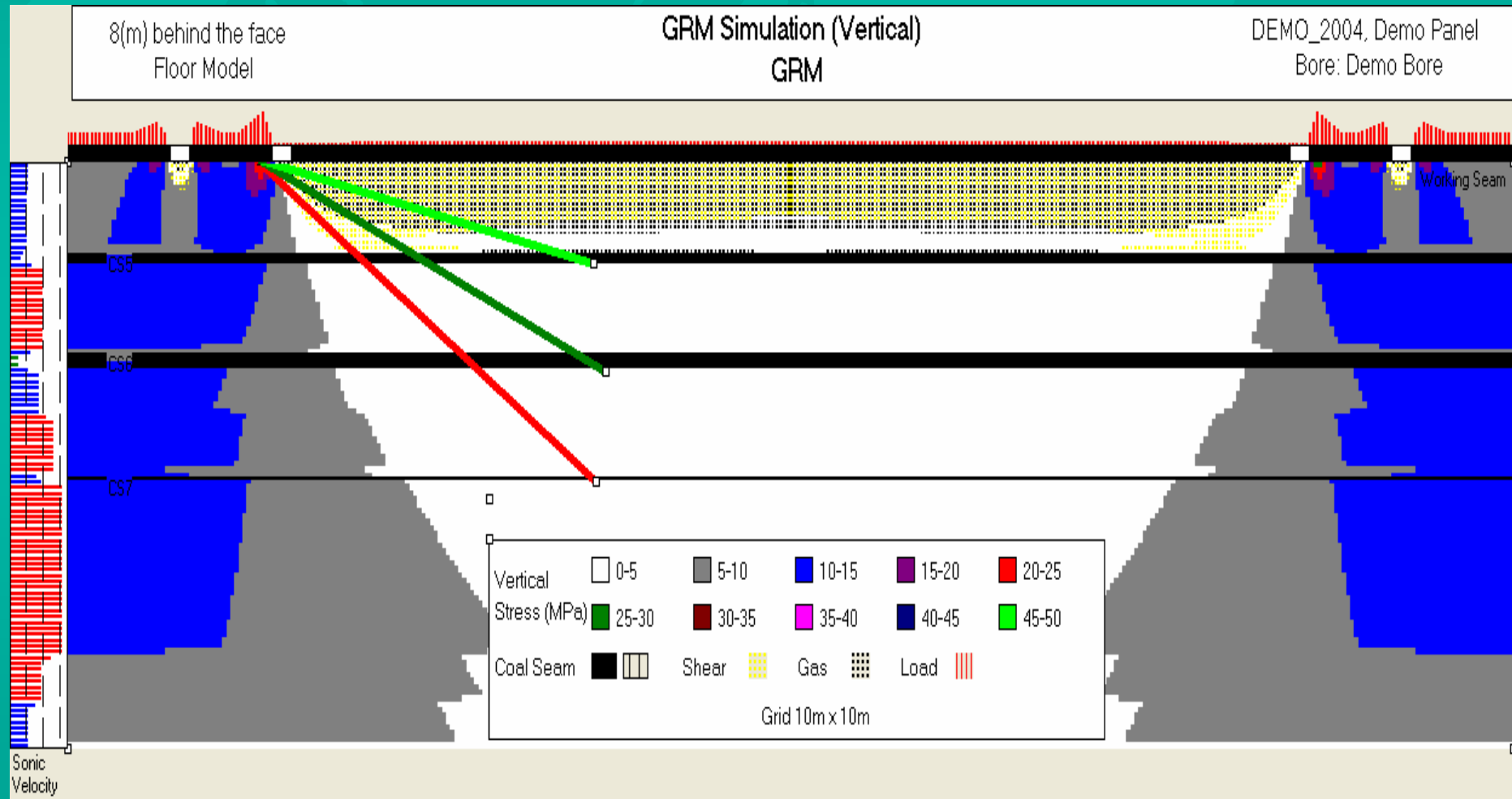
# GRM floor simulation 6m behind the face





# GRM floor simulation

## 8m behind the face





# GRM floor simulation 10m behind the face

