

# Coal Mine Methane Drainage Considerations

for the

## Sabinas Basin, Coahuila Mexico

Presented to:  
M2M Technical Workshop  
Monterrey, Mexico

Presented by:  
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REI Drilling, Inc.

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# Presentation Outline

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- **Background**
- **Geology and Reservoir Characteristics of the Sabinas Basin**
- **CMM Drainage Techniques**
- **Case Study and Results**
- **Considerations**



# REI DRILLING, INC.

- Operate 7 long hole directional drills and 2 core drills on a contract basis across North America.
- Provide methane drainage consulting and directional drilling training.
- Developed first US in-mine CMM recovery and sale project.
- Managed and participated in numerous international directional drilling projects.
- Expanded uses for directional drilling. e.g. exploration and dewatering
- 25 years experience.



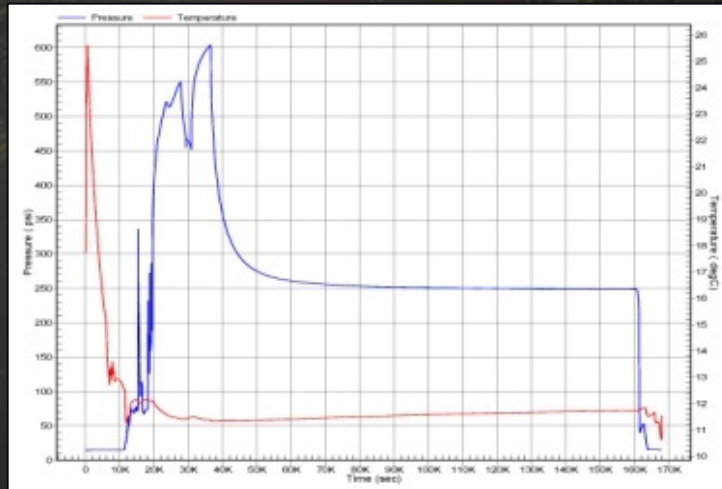
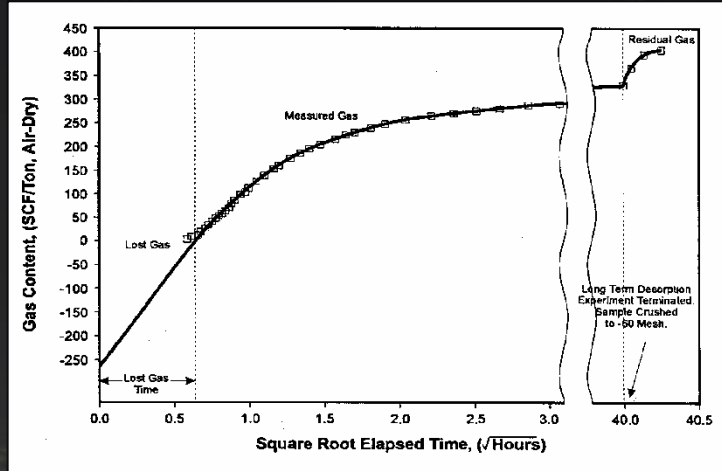
# 19 Years Experience in Sabinas Basin

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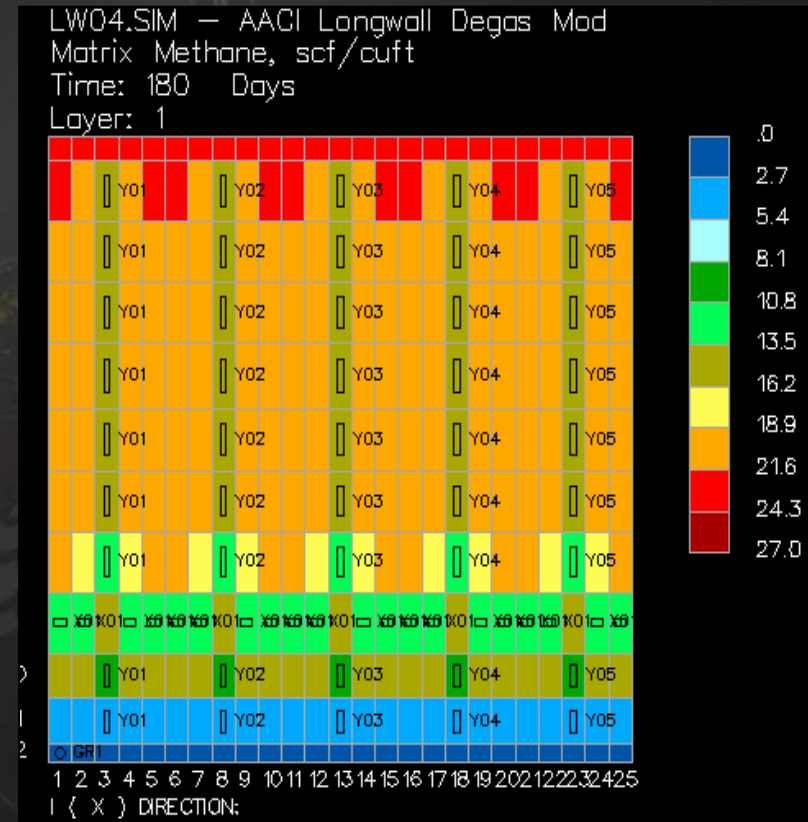
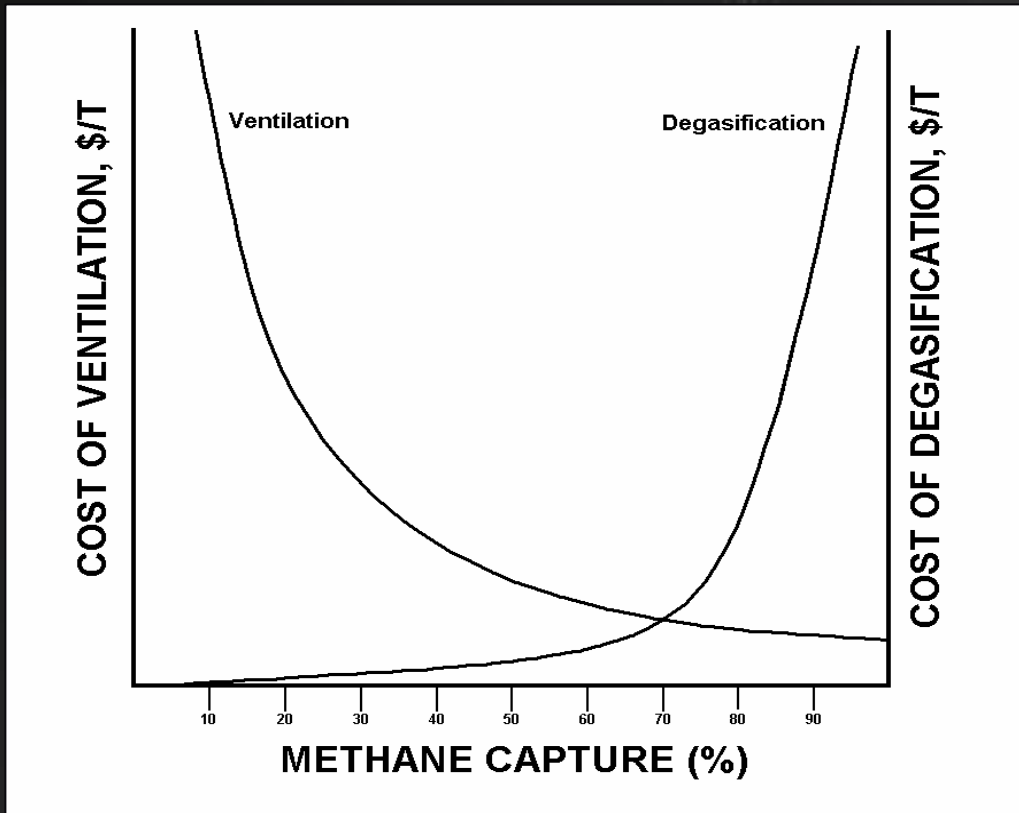
- 1990: Conceptualized & implemented Surface CBM test project at Pasta de Conchos Mine (IMMSA)
- 1990-91: In Mine Methane drainage (CMM) project at Pasta de Conchos Mine
- 1992-2000: In Mine Methane drainage (CMM) project at MIMOSA's Mine II, IV and VI
- 1993: In Mine Methane drainage (CMM) project at Pasta de Conchos Mine
- 1995: Discussion for CBM development with GAN
- 2004: Sale of drill & CMM training of MIMOSA personnel
- 2008: Fletcher Training for Mimosa personnel



# Geologic Reservoir Characteristics



# Ventilation vs. Methane Drainage



# Olmos Reservoir Conditions

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## → Results of Field Tests (CNR):

- Depth: 170 m
- Coal Thickness: 3.9 m
- Coal Rank: High Volatile A ( $R_o = 0.99\%$ )
- In-Situ Gas Content:  $8.4 \text{ m}^3/\text{t}$
- Desorption Time: 56.6 hours
- Permeability: 33.6 md
- Cleat Spacing: 1 mm
- Gas Composition: 89.97%  $\text{CH}_4$
- Under Pressured: 7 kPa/m

# Observations

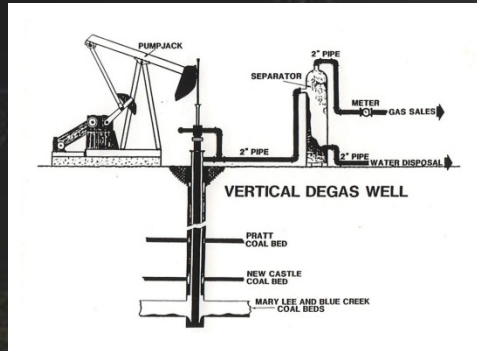
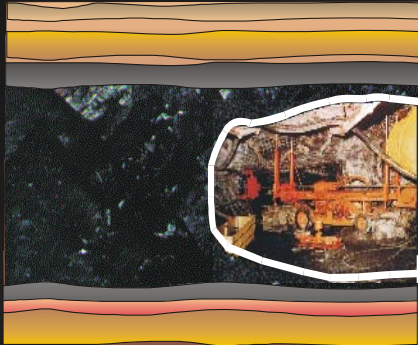
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- A shallow single thick high gas content coal seam.
- Thick clay parting – “Double Seam”
- Thick clay zone on top of coal
- Minimal gas bearing strata or other coal seams in overlying strata
- High Permeability
- Short Sorption times

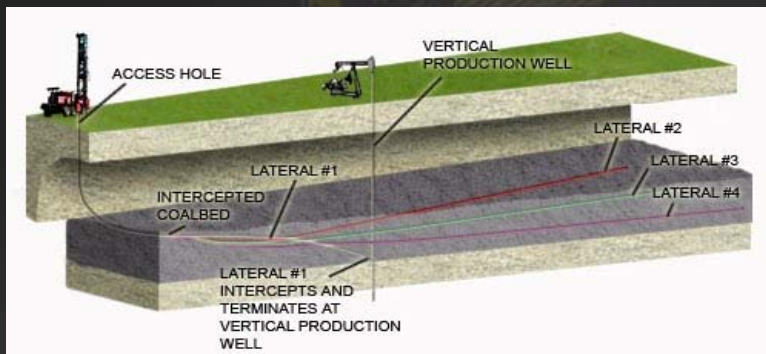
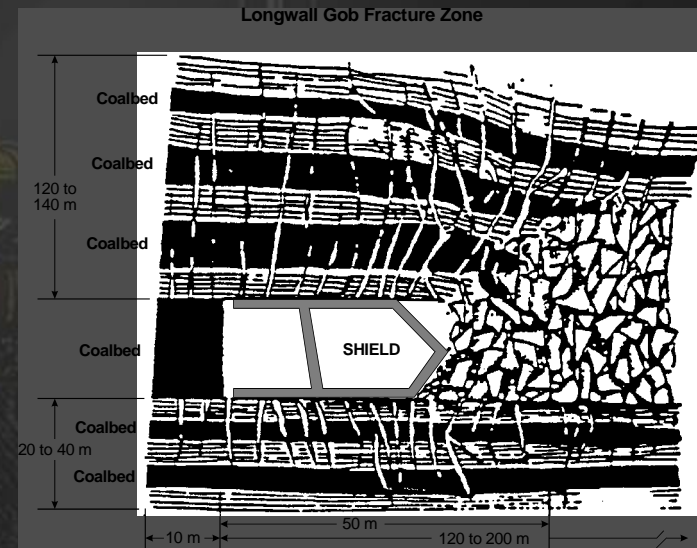


# Methane Drainage Techniques

- Pre-Mining

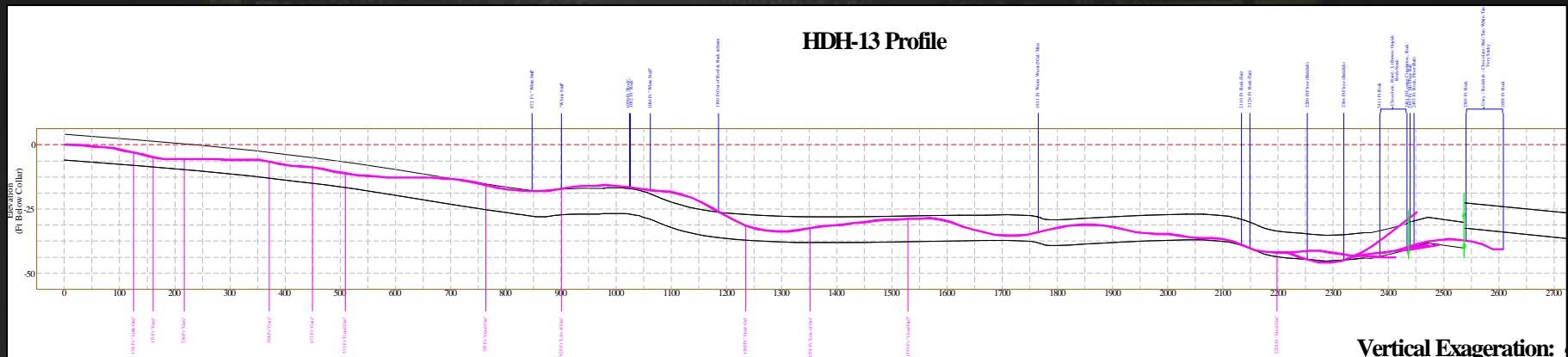
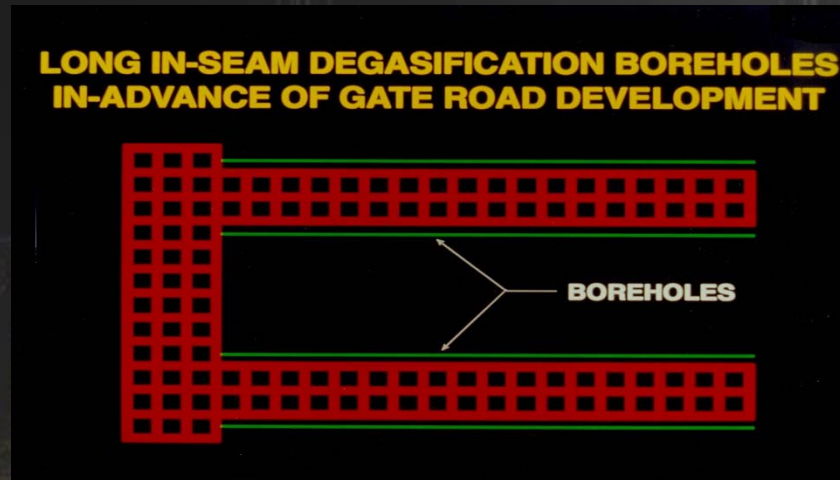


- Gob Degasification

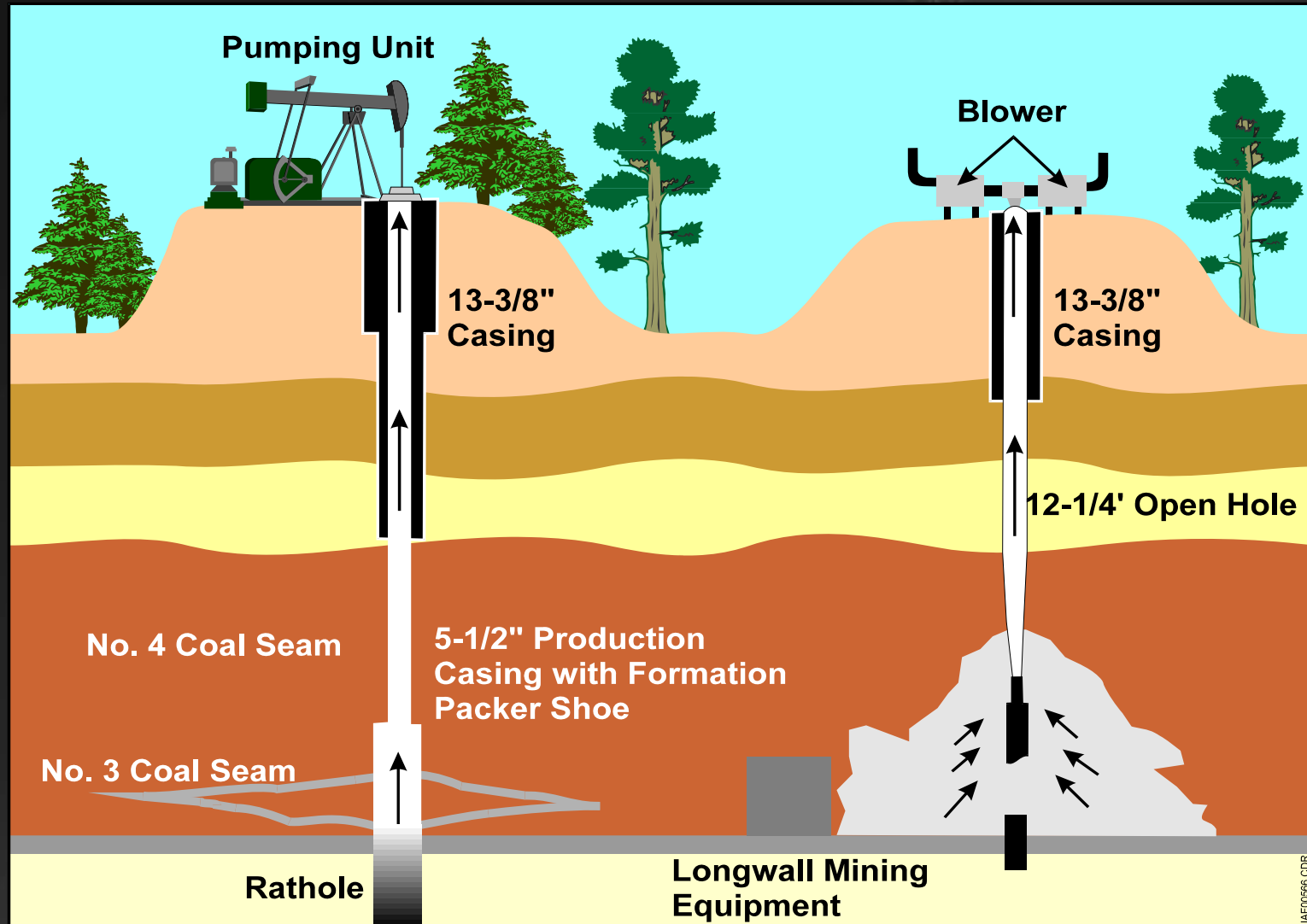


# Methane Drainage

- Pre-Mining - Long, In-Seam Boreholes:



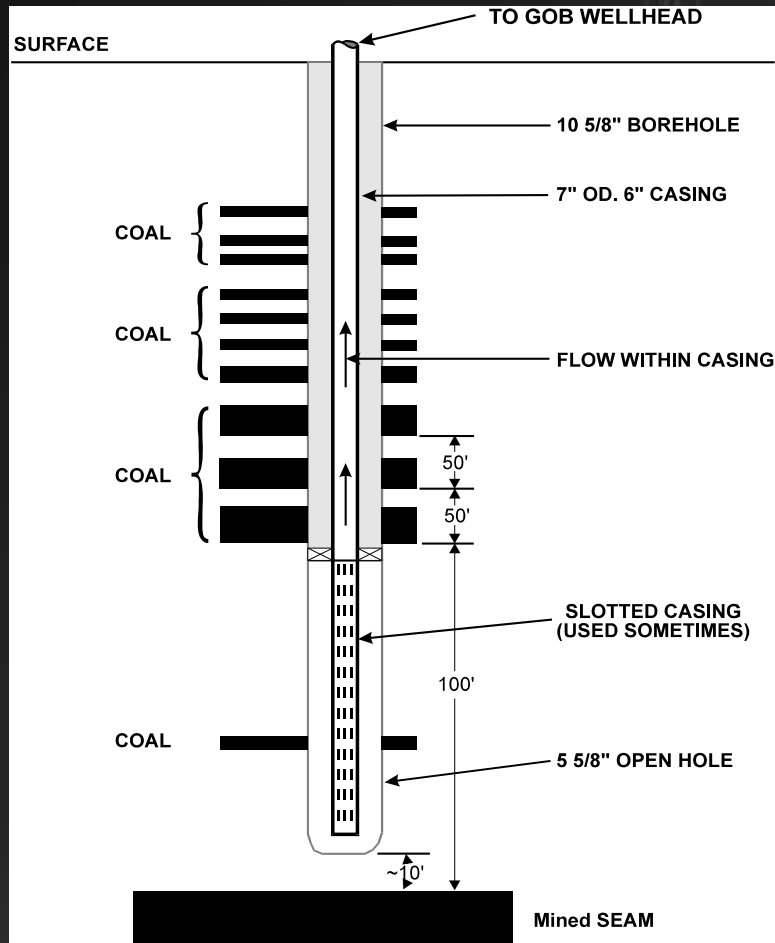
# Design of Vertical CBM and CMM Wells



JAF0586.CDR

# Methane Drainage

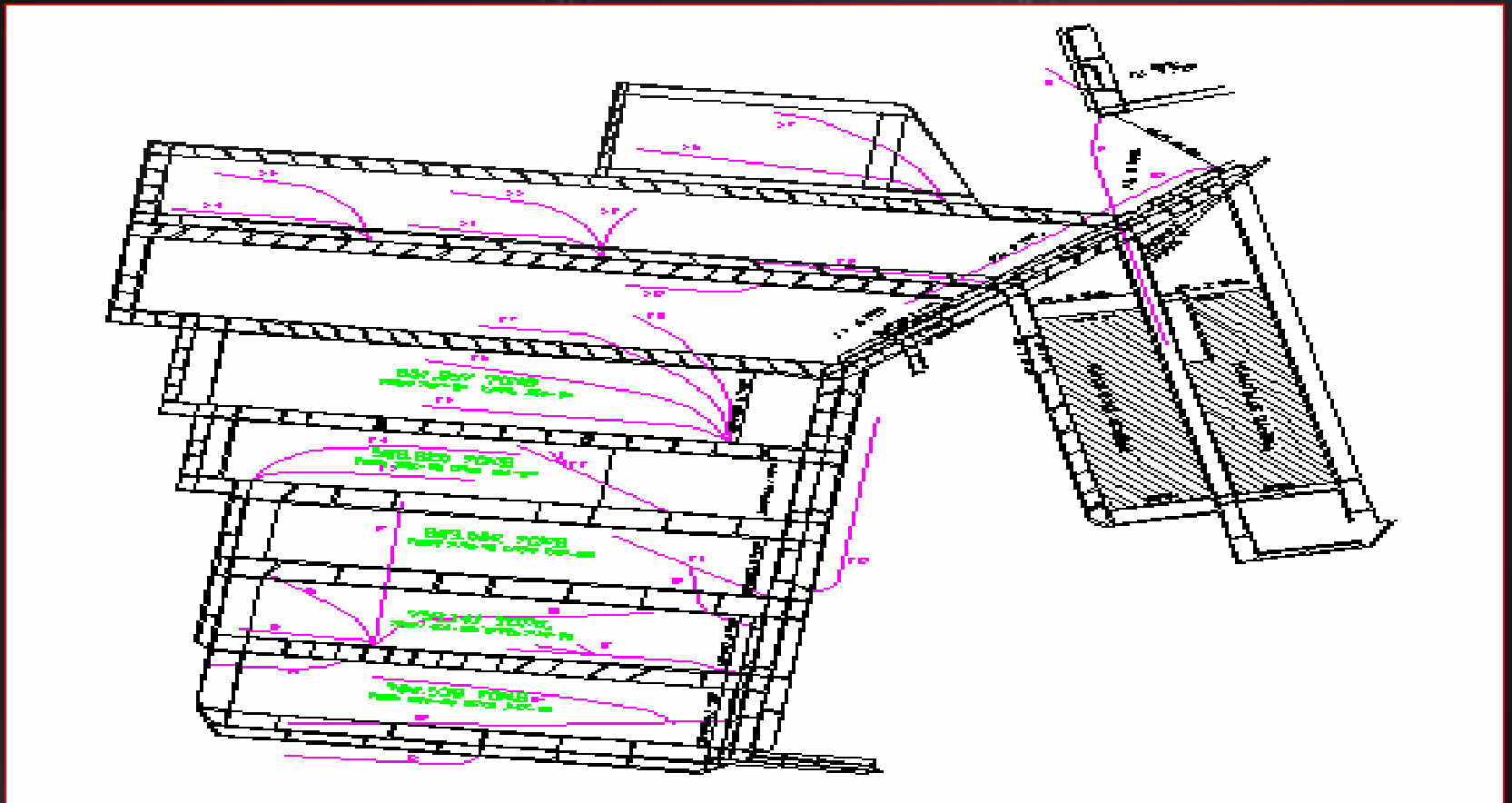
## ● Gob Gas – Vertical Gob Wells





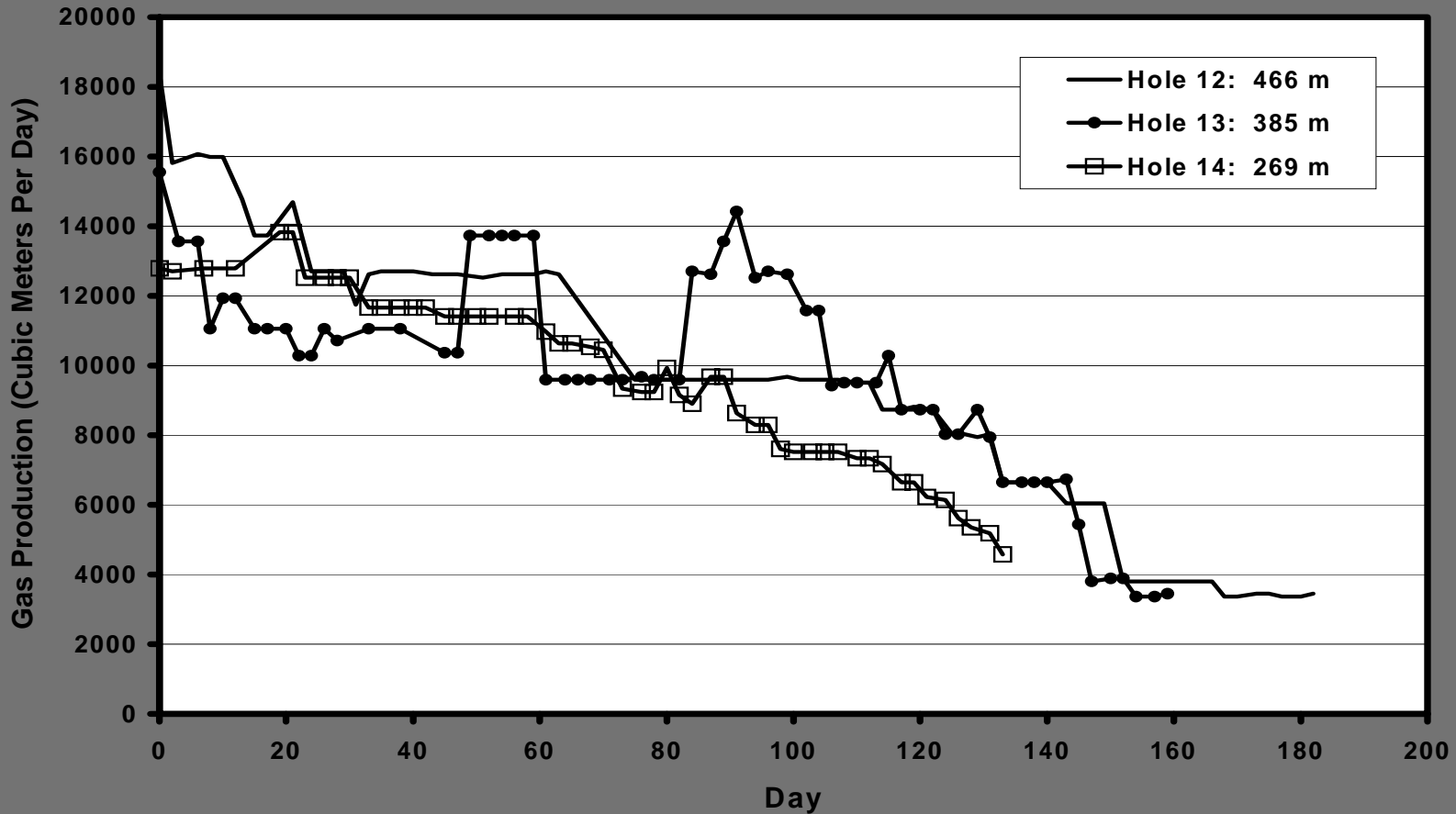
# Case Study Mimosa #1 and #2

# Methane Drainage Approach



# Mimosa Gas Production

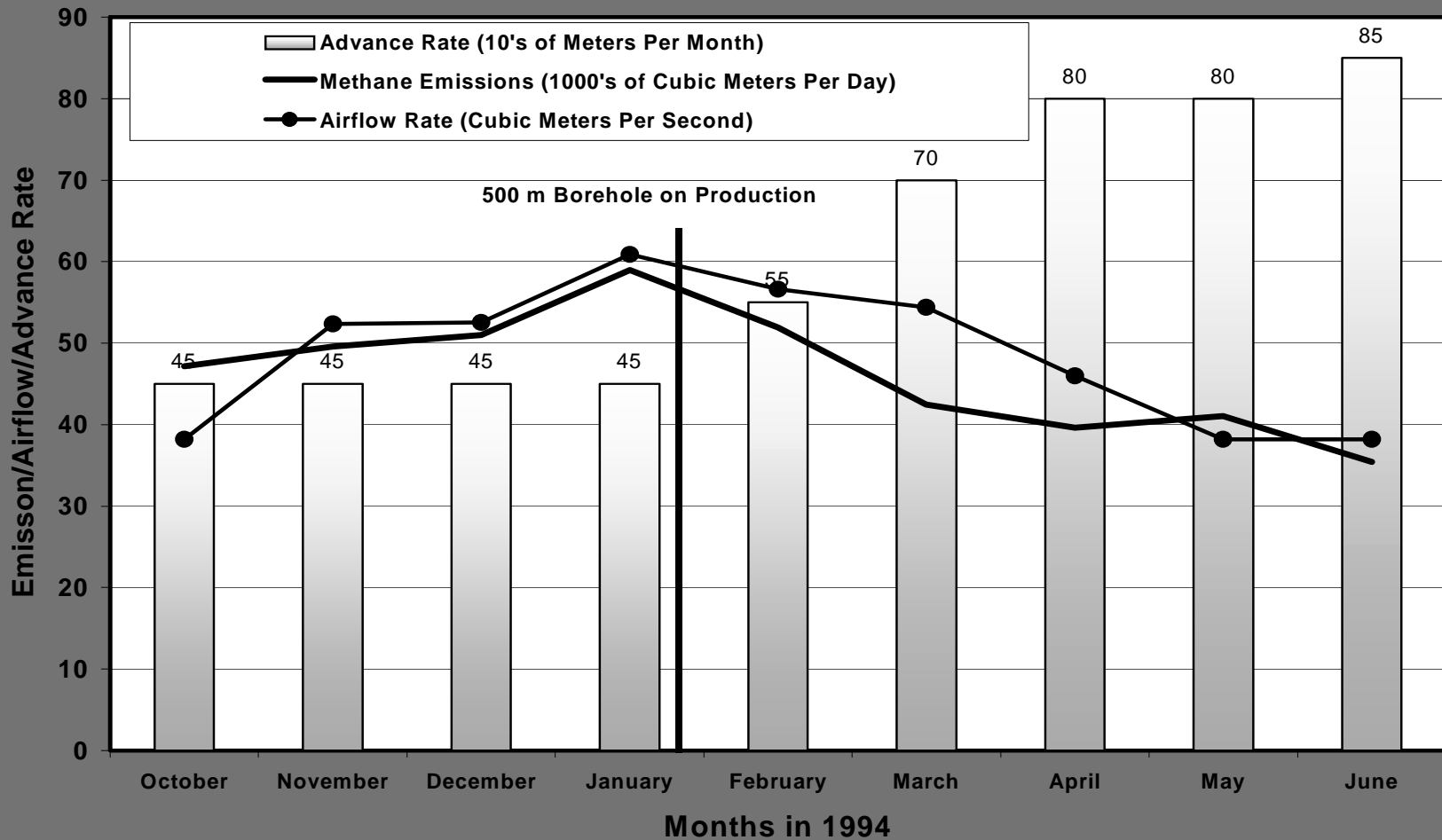
Average Daily Gas Production For In-Seam Boreholes  
MIMOSA Mina I



# Effect on Gate Road Development

## MIMOSA #1 Mine

Methane Emissions, Airflow Requirements, and Advance Rate Before and After Degasification for 2 West Developments, Mine I

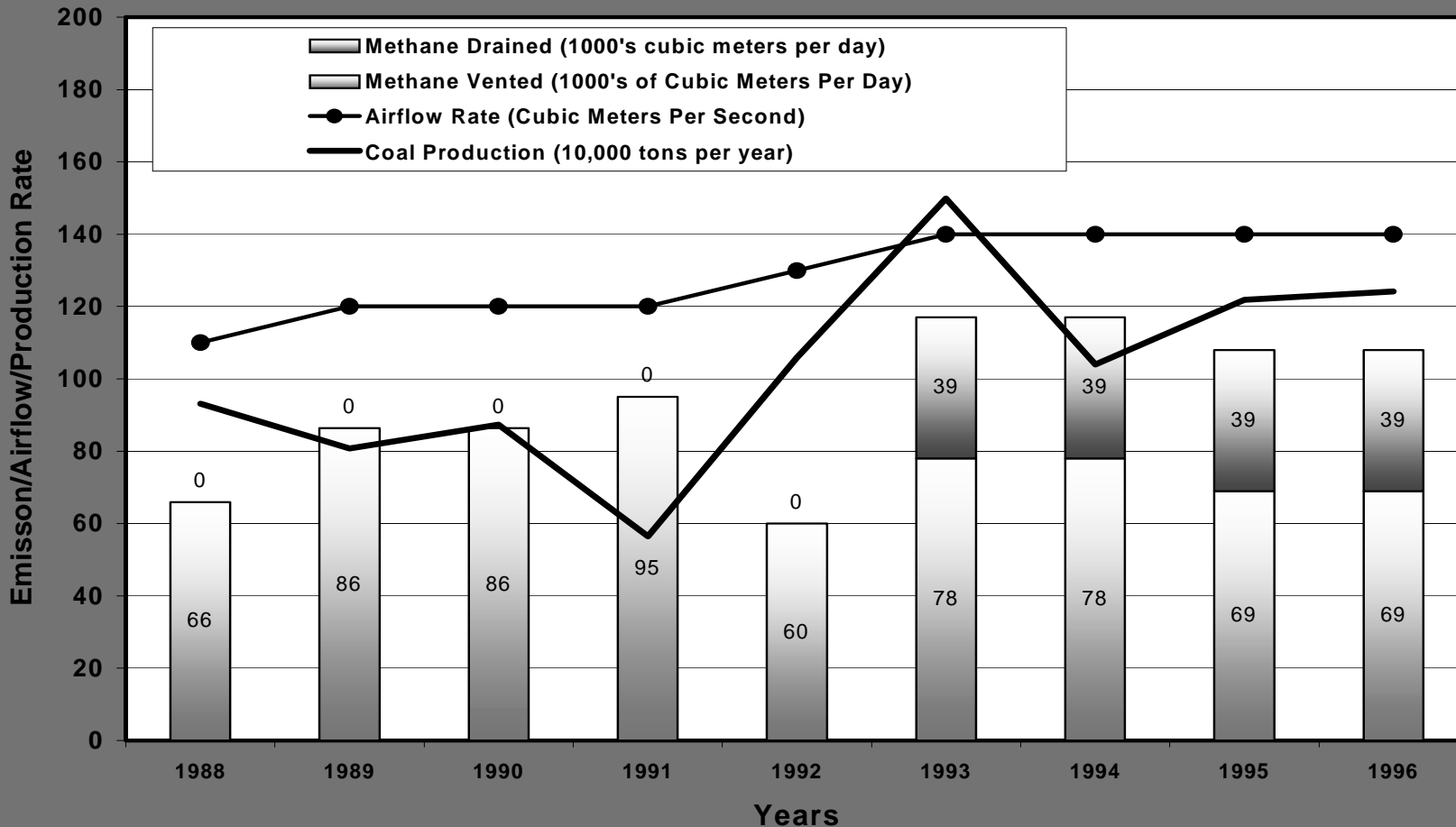




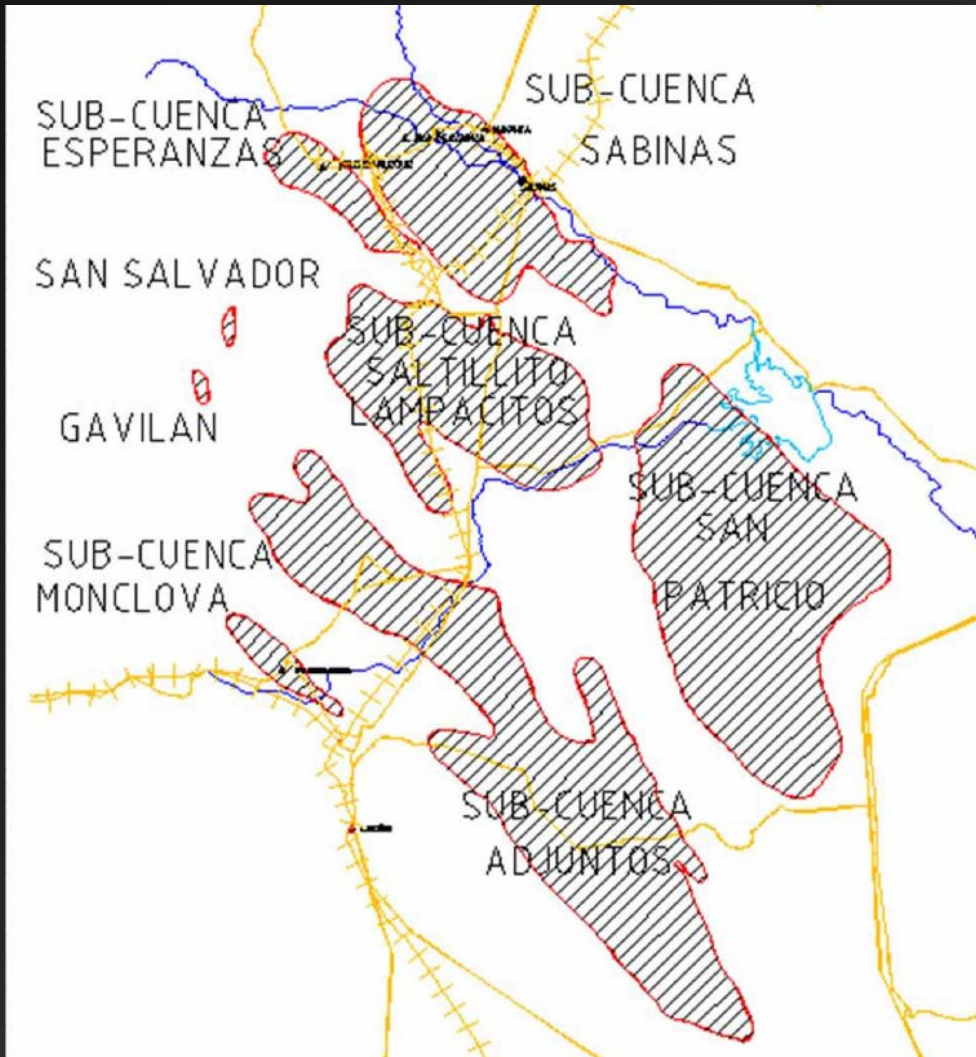
# Methane Drainage Results

Mimosa Mine #2

Mine II Methane Vented, Drained, Airflow Requirements, and Production Rate Before and After Degasification in 1993



# Cretaceous Age Sub Basins



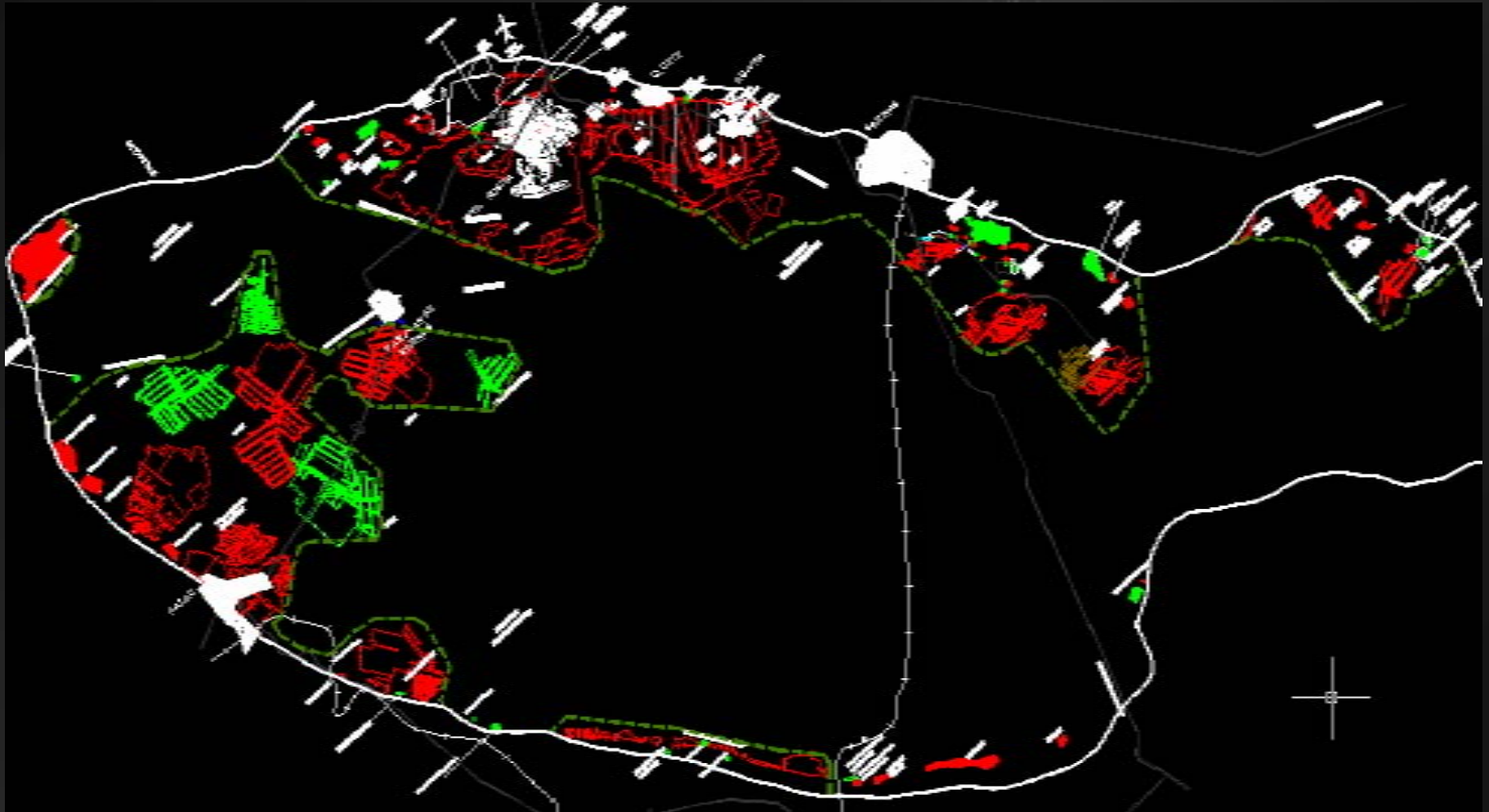
## Six (6) Sub-Basins ("sub-cuencas"):

- 1.Sabinas
- 2.Esperanzas
- 3.Saltillito
- 4.San Patricio
- 5.Adjuntos
- 6.Monclova

## Main Basin: Sabinas

Most mine projects have been developed here. The Sabinas sub-basin has been well characterized with almost 80% explored

# Sabinas Basin



# Keys to Prospect Generation

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- In-place resource
- Geologic and reservoir characteristics
- Land acquisition
- Market considerations
- Drilling and completion costs
- Economic viability
- Favorable surface culture
- Financing



# Project Considerations

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- Scale
- Business Climate. Pace
- Ownership issues. Clear title?
- Local perception
- Coordination of mining, drilling, and gas recovery operations
- Market? Pipeline? Need to create gas utilization alternatives
- Environmental factors



# Ownership Issues

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## International Background

Unclear CBM ownership has stalled development in many countries

- Different laws governs ownership of CBM in the USA
- Concept of “forced pooling”

## Mexican Background

Gas Associated to Mineral Carbon Deposits (*gas grisú*) – mostly methane

- Ministry of Energy and Ministry of Economy
- Regulatory Law of Article 27 of the Mexican Constitution Regarding Oil and the Mining Law (*Ley Minera*)
- Amendment 11/08 and regulations published on 12/16/08
- Restricted use to self consumption by holder of mining concession or delivery to PEMEX through purchase Agreement
- sale to third parties by concession holder is prohibited
- Permit application guidelines include demonstrate the evidence of gas, utilization approach, recovery process, and financial analysis.

# Coordination of Operations

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- Mining



- Drilling



# Coalbed Methane Utilization

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# Environmental Considerations

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- Global attention on GHG mitigation projects
- Methane unique due to energy value
- High demand
- Monetization of credits
- CO2 Sequestration projects
- Public and private funding





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