ASSESSMENT OF SEALED OFF AREAS AT MOONIDIH MINE, INDIA

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Outline of Presentation

- Coal mining/CMM in India
- Objective and scope of the study
- Study site/Moonidih Mine
- Sampling plan
- Results
- Proposed CMM recovery scheme
- Barriers
- Summary

Coal Mining in India

- Coal accounts for ~55% commercial energy
- Total coal reserve 246 BT
- India: 3rd largest coal producer in world
- Annual coal production 538 MT (2010-11)
- 85% from surface operations and 15% from underground mining
- 384 underground mines
- Degree I, II and III mines in order of gasiness
- 19 degree III gassy mines (> 10 m^3/t of coal)

CMM Scenario in India

- No apparent CMM recovery activity in India
- U/g production decreasing
- Low priority
- Future demand to be met from u/g mining due to social problems with surface operations
- CMM will be important for deep coal mines
- One reason why CMM extraction has not started is the of lack of scientific data on CMM resource and feasibility of extraction

Objectives

- Create scientific data base for possible CMM extraction scheme at a prospective Indian mine
- Evaluate a prospective Indian mine for potential CMM recovery and utilization
- Moonidh Mine was selected for the study – it is one of the gassiest in India
- Study was conducted between June 2010 and June 2011

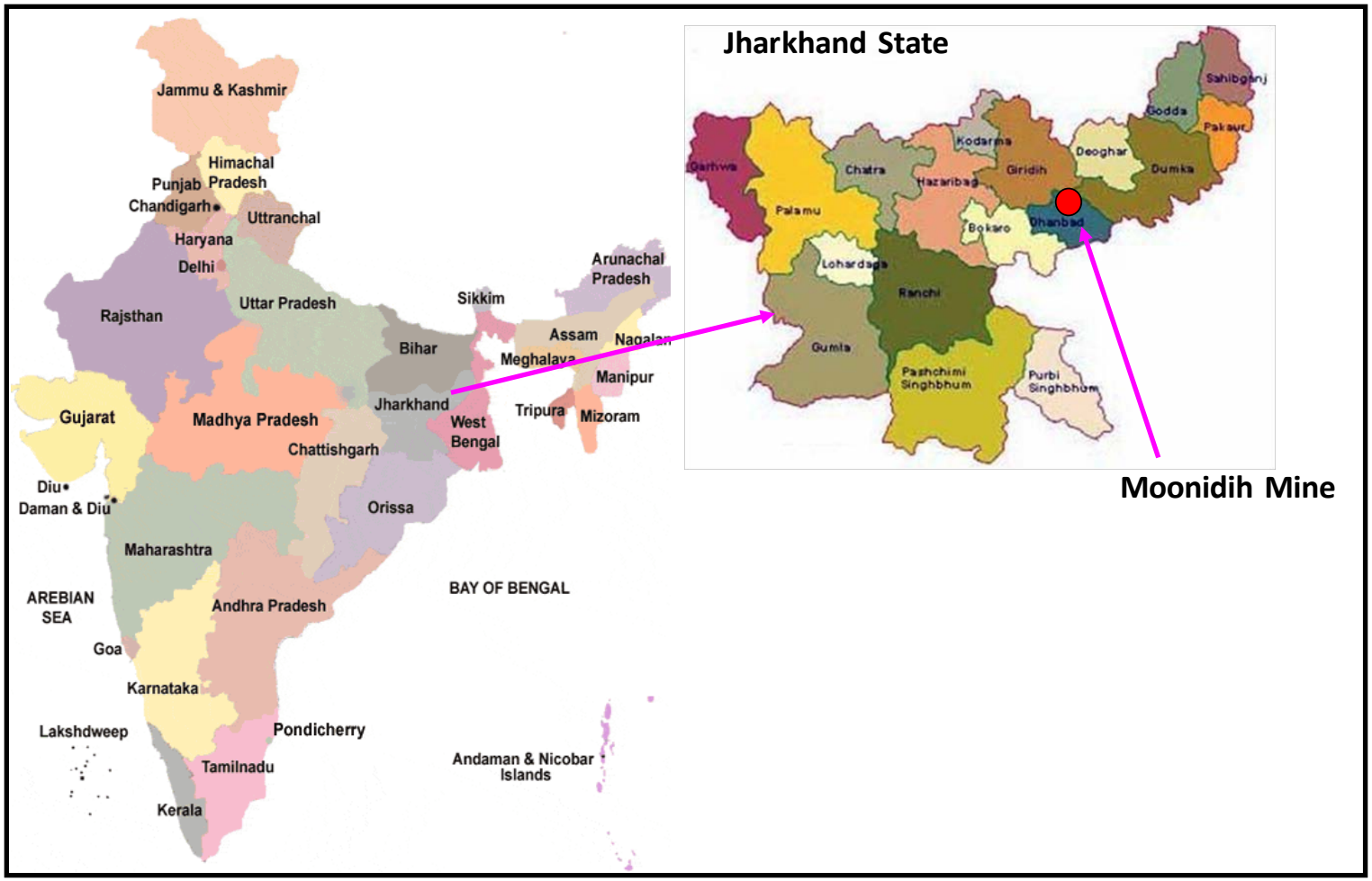
Study Site/Moonidih Mine

- Very old mine (started in 1965)
- Deep (>600 m)
- Degree III gassy mine
- Longwall operation with caving
- Extensive gob area (67 sealed off areas)

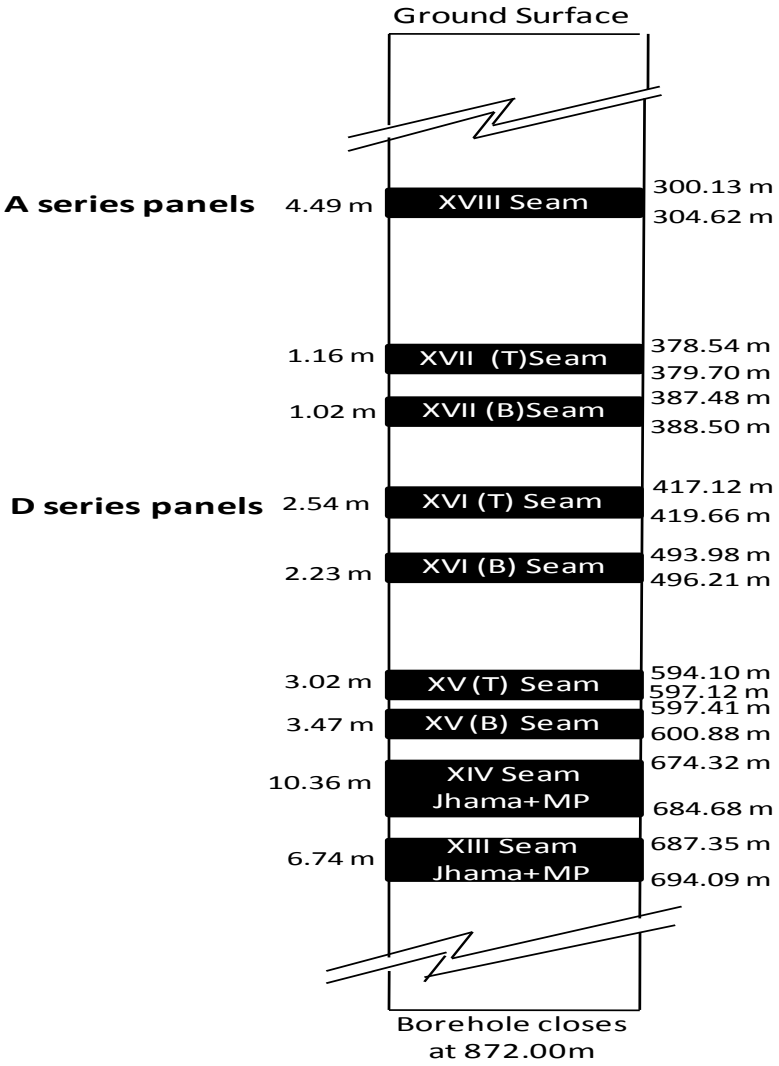
Other advantages:

- CBM drilling from virgin seams
- Production of electricity using gas engines

Location of Moonidih Mine



Borehole log of Moonidih Mine



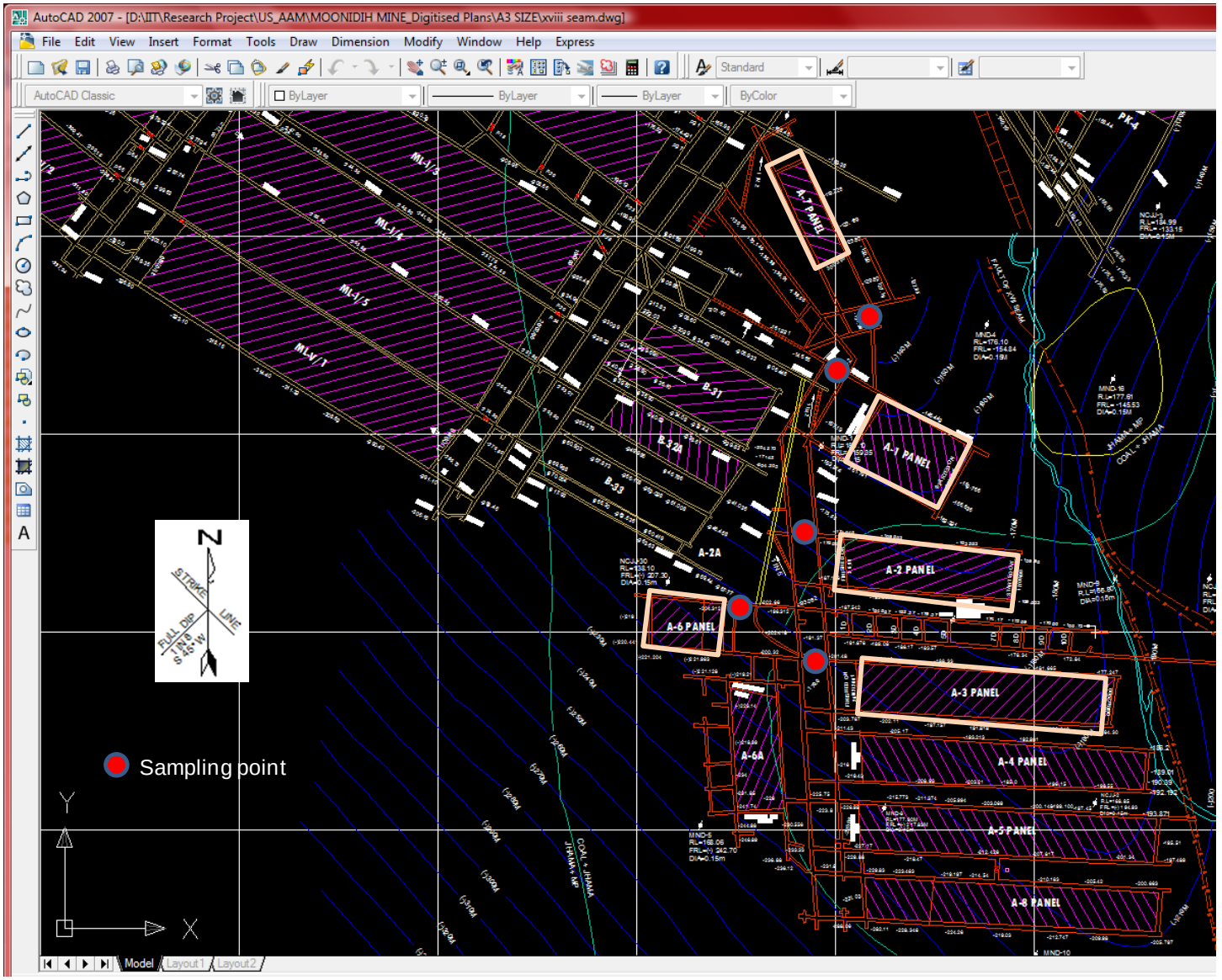
Seam-wise Coal Reserve

Name of the Seam	Geological Reserve (Mt)	Mineable Reserve (Mt)	Present Status of the Seam
XVIII	13.40	7.9	Major part blocked within multiple faults. Sizeable area contains Jhama.
XVII (T)	12.60	5.3	Worked and exhausted
XVII (B)	18.90	4.85	Non-workable - thin seam
XVI (T)	21.30	9.06	Major part exhausted
XVI (C)	3.60		Jhama and stone intrusion
XVI (B)	22.10	7.72	Minor part workable; Dip side thinned; Nearly virgin; Development work started.
XV (T)	48.20	11.80	Totally virgin
XV (B)	58.70		Totally virgin
XV(C)	9.00		Totally virgin

Sealed Areas Studied

Name of Panel	Name of the Seam	Depth of Working (m)	Panel Dimensions (m×m)	Date of Abandonment of Panel	Height of Working (m)	Volume of Worked Out Area (x 1000 m^3)
A1	XVIII	320-400	212 × 144	27.05.1996	2.4	73
A2	XVIII		344 × 92	03.06.1999	2.4	76
A3	XVIII		520 × 92	26.02.2001	2.4	115
A6	XVIII		144 × 100	-	2.4	35
A7	XVIII		204 × 60	06.11.1996	2.4	29
D8	XVI (Top)	430-530	680 × 140	10.07.1998	2.4	228
D9	XVI (Top)		640 × 132	30.10.2001	2.4	203
D10	XVI (Top)		660 × 104	20.02.2002	2.4	165
D11	XVI (Top)		680 × 140	31.05.2004	2.4	228

Panels selected based on size, methane concentration, accessibility.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File Edit View Insert Format Tools Draw Dimension Modify Window Help Express
A-1 PANEL
A-2 PANEL
A-3 PANEL
A-4 PANEL
A-5 PANEL
A-6 PANEL
A-7 PANEL
A-8 PANEL
A-2A
A-6A
B-31
B-32
B-33
ML-1/1
ML-1/2
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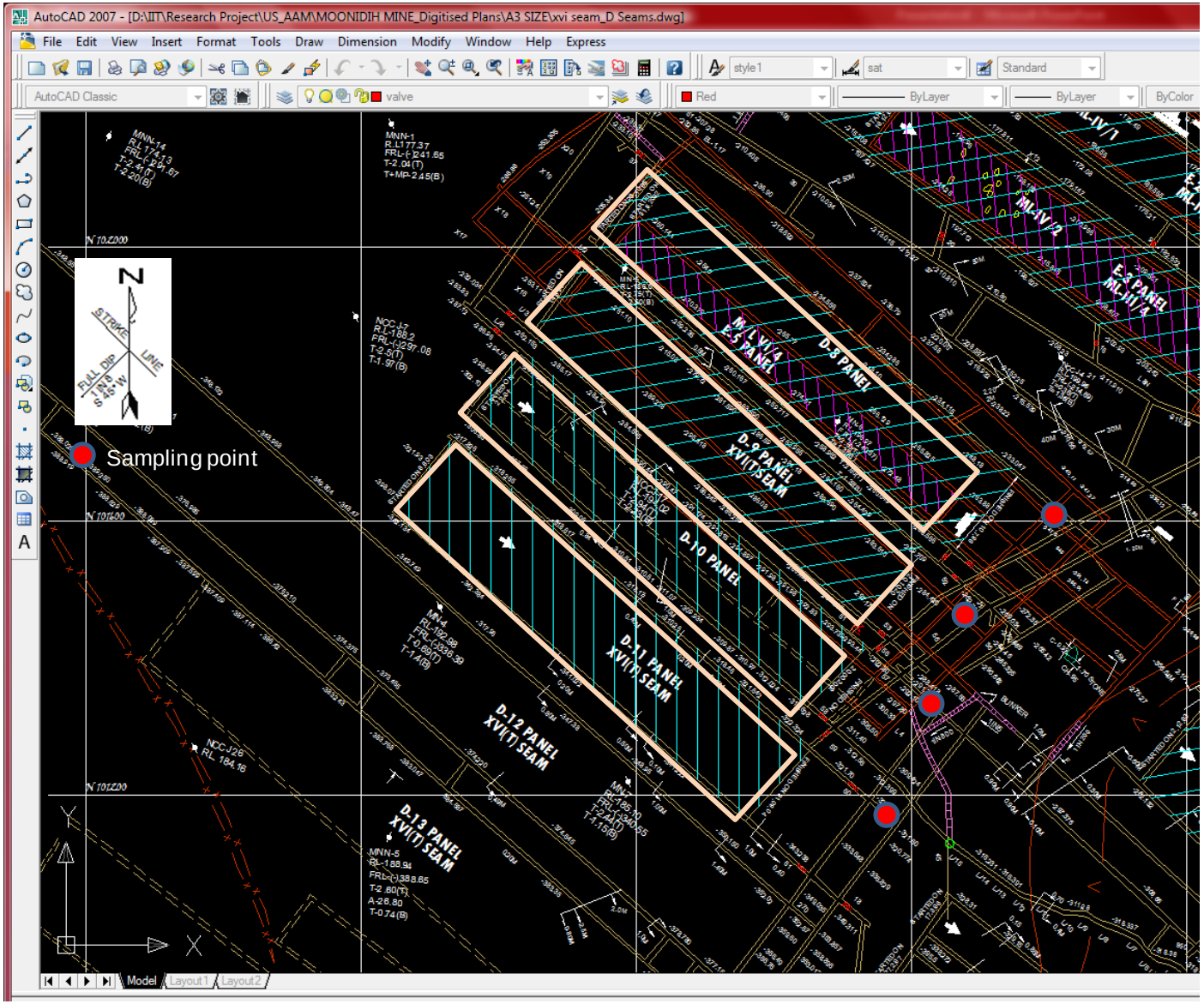
S 45° W
Sampling point
Y
X
Model
Layout1
Layout2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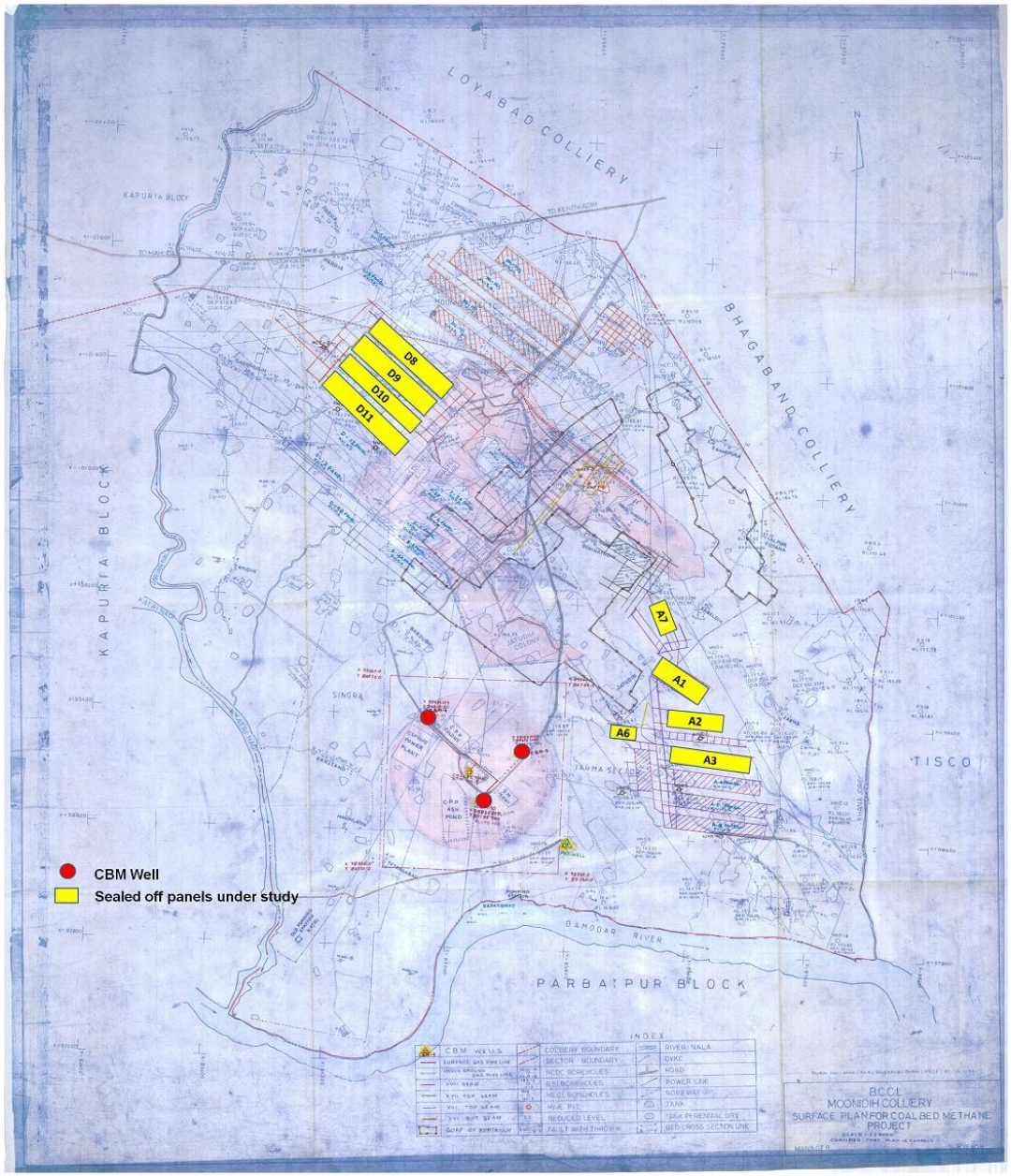
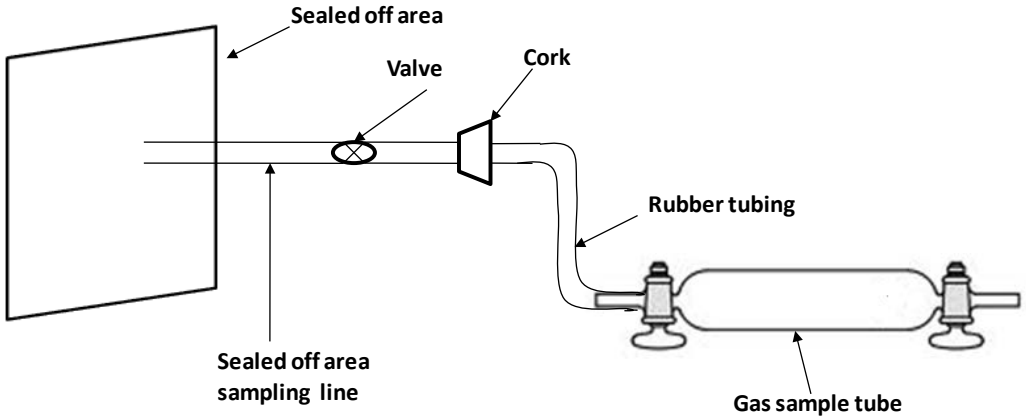
S 45° W
Sampling point
D-8 PANEL
D-9 PANEL
XVI(T) SEAM
D-10 PANEL
D-11 PANEL
XVI(T) SEAM
D-12 PANEL
XVI(T) SEAM
D-13 PANEL
XVI(T) SEAM
E-2 PANEL
XVI(T) SEAM
N 102000
N 101400
N 101200
Model
Layout1
Layout2

Surface Plan

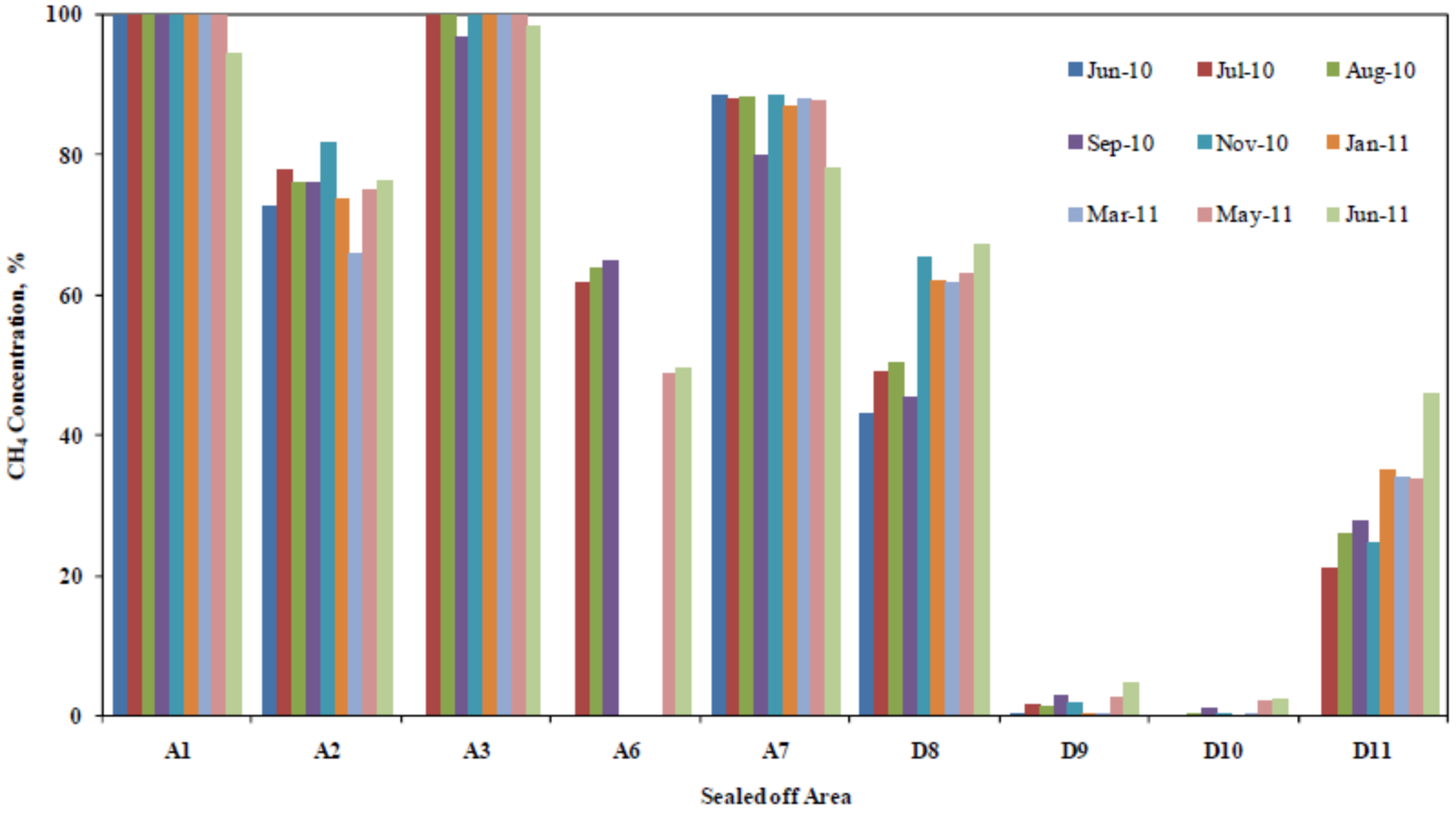


Sampling Plan

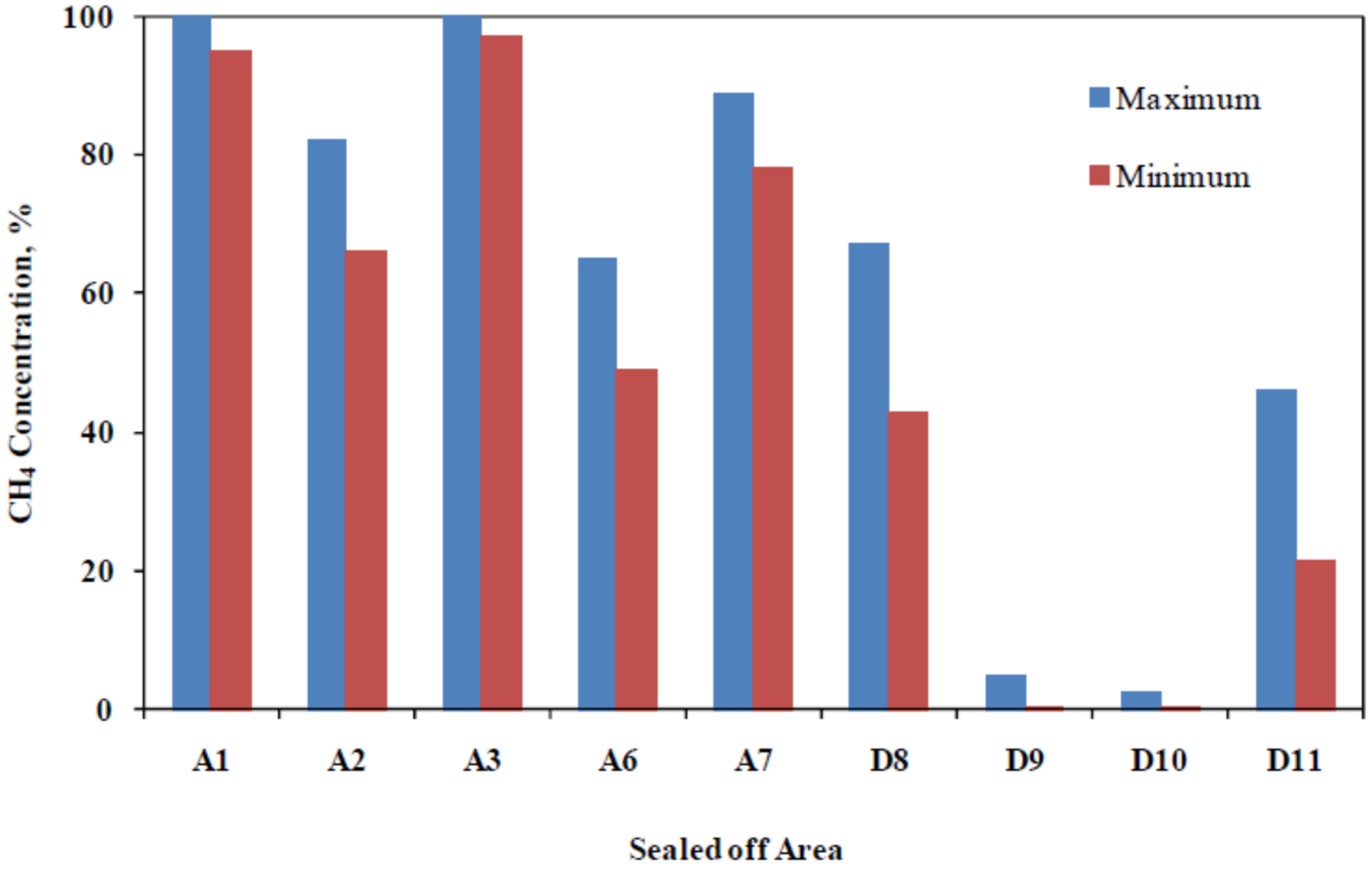
Spot samples were collected at 15-day intervals



Methane Concentration



Max-/ Min- Methane Concentration



Classification of Sealed Areas

Category	Methane Concentration	Sealed off Areas
High methane concentration	> 70 %	A1, A3, A7
Medium methane concentration	25 - 70%	A2, A6, D8,
Low methane concentration	5 - 25%	D11
Very low methane concentration	< 5%	D9, D10

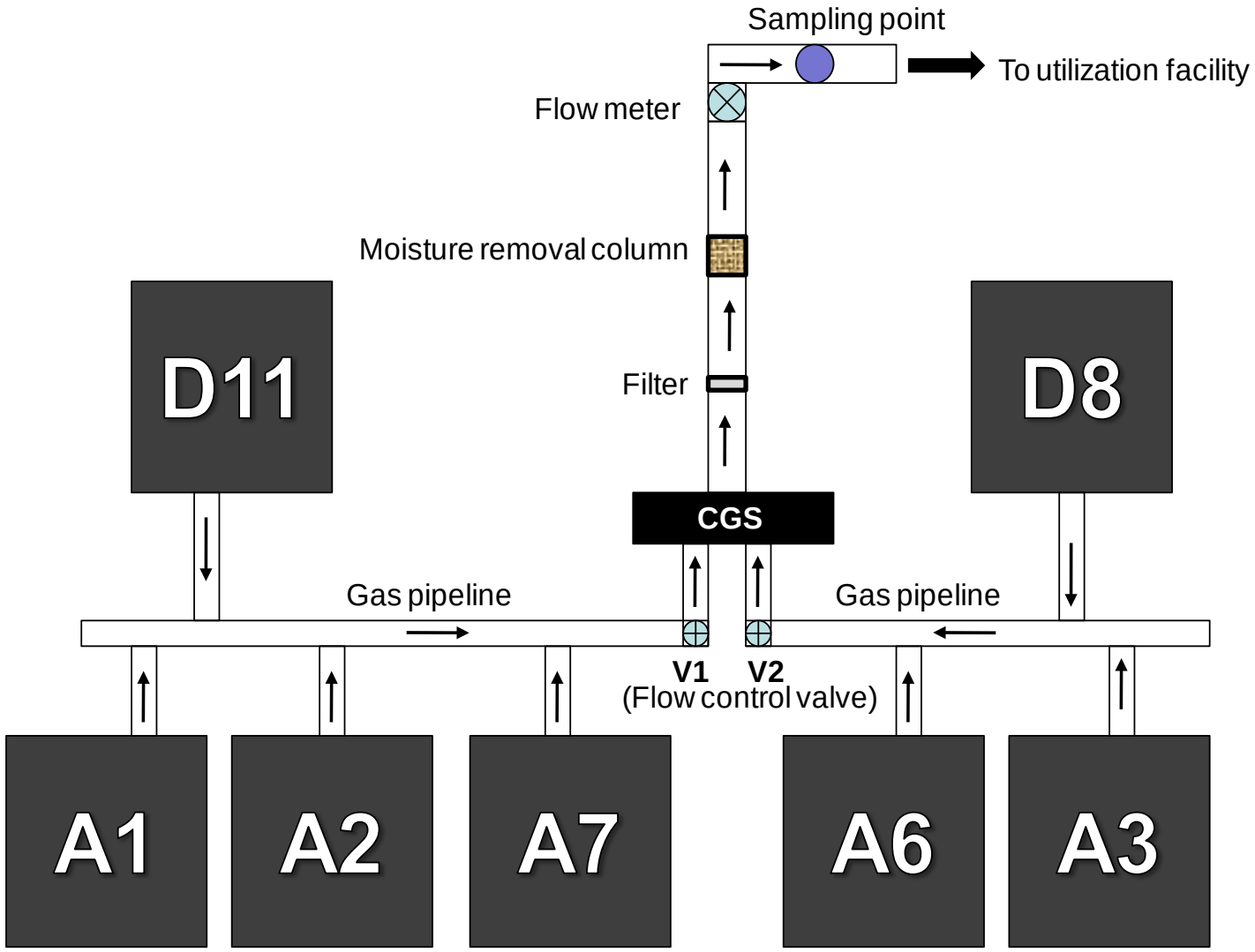
Estimated Methane in Sealed Areas

Panel Name	Sealed off Panel Volume (m^3)	Methane Emission (Min) (m^3)	Methane Emission (Max) (m^3)
A1	73,267	249,592	436,786
A2	75,955	258,749	452,811
A3	114,816	391,132	684,481
A6	34,560	117,732	206,031
A7	29,376	100,072	175,126
D8	228,480	1,795,996	3,142,993
D11	228,480	1,795,996	3,142,993

CMM Recovery Potential of Sealed Areas

Panel Name	Minimum Methane Volume (m^3)	Minimum Methane Concentration (%)	CMM Recovery Potential
A1	249592	95	Good
A2	258749	66	Moderate
A3	391132	97	Good
A6	117732	49	Moderate
A7	100072	78	Good
D8	1795996	43	Moderate
D11	1795996	21	Low

Proposed CMM Recovery Scheme



Proposed CMM Recovery Scheme

- Seven panels are divided into two groups and CMM from two groups extracted alternatively until concentration reduces to 25%
- Group I: A1, A2, A7, and D11. Total CMM quantity: 2.4- 4.1 MMm^3 with initial average concentration of ~ 50%
- Group II: A3, A6, and D8. Total CMM quantity: 2.3 - 4.0 MMm^3 with an average concentration of ~62%
- Continuous and cyclic production of CMM from Group I and Group II panels

CMM Recovery and Barriers

- Most prospective utilization alternative is power generation by on-site combustion using IC engine

Barriers

- Priority (mining vs. methane extraction)
- Permission from DGMS: may not be easy, simple or quick
- Accessibility: some panels may be flooded and can not be accessed from underground
- Technical expertise lacking (in-seam drilling, deep drilling, well completion)
- Lack of pipeline infrastructure

Summary

- Study was carried out for 9 panels.
- 7 panels have good to moderate potential
- CMM recovery scheme was proposed with cyclic production from two groups of panels
- Barriers to CMM recovery were identified
- IC engine recommended as the most suitable option

THANK YOU!!!!

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