

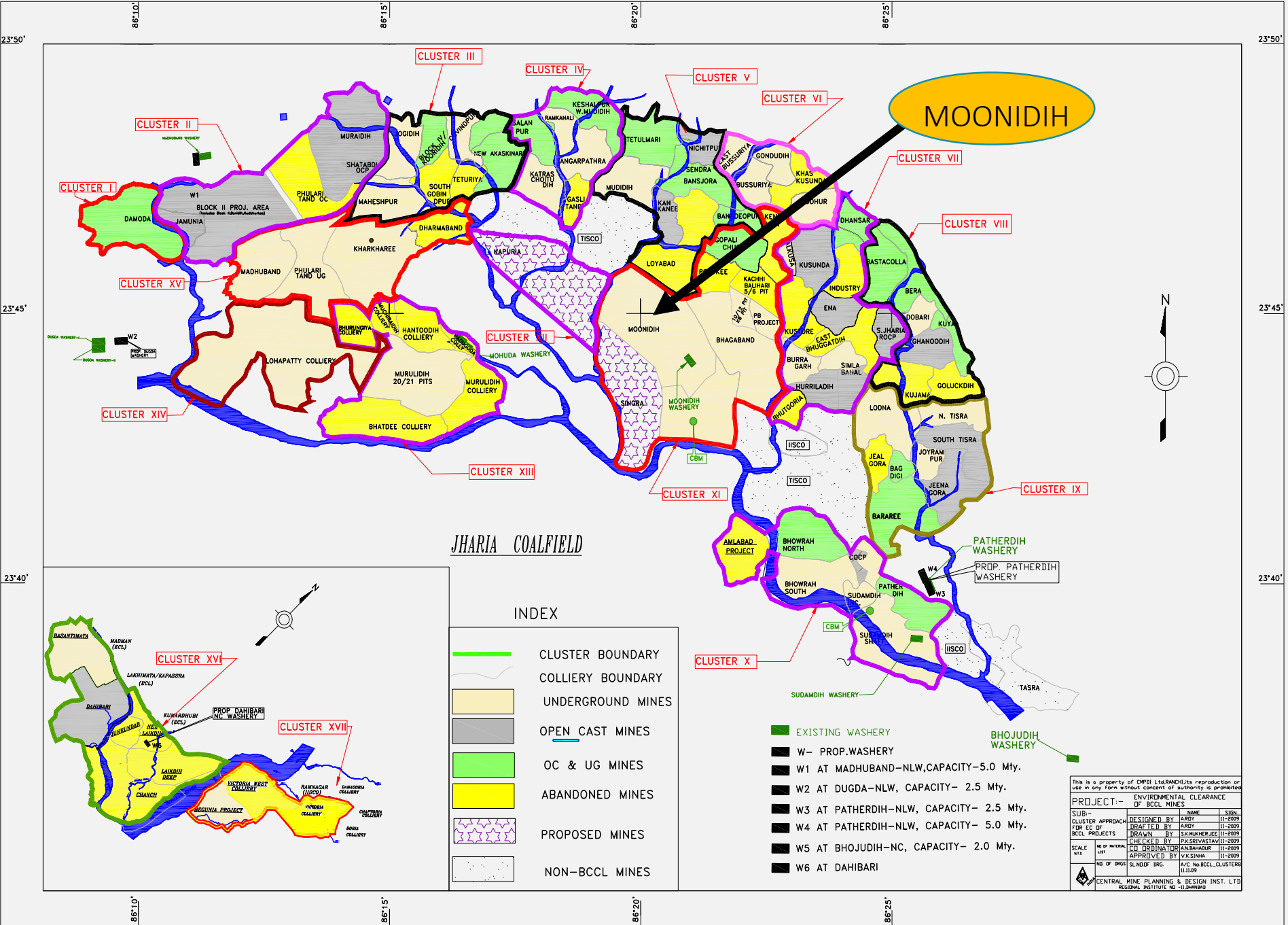


Challenges on Methane Drainage at Moonidih

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JHARIA COALFIELD

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- EXISTING WASHERY
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PROJECT:- ENVIRONMENTAL CLEARANCE OF BCCL MINES

SUB-PROJECT	DESIGNED BY	NAME	SIGN.
CLUSTER APPROACH FOR CC OF BCCL PROJECTS	DRAWN BY	ARJY	11-2009
	CHECKED BY	S.K. MUKHERJEE	11-2009
	APPROVED BY	V.K. SINHA	11-2009

SCALE: 1:50,000

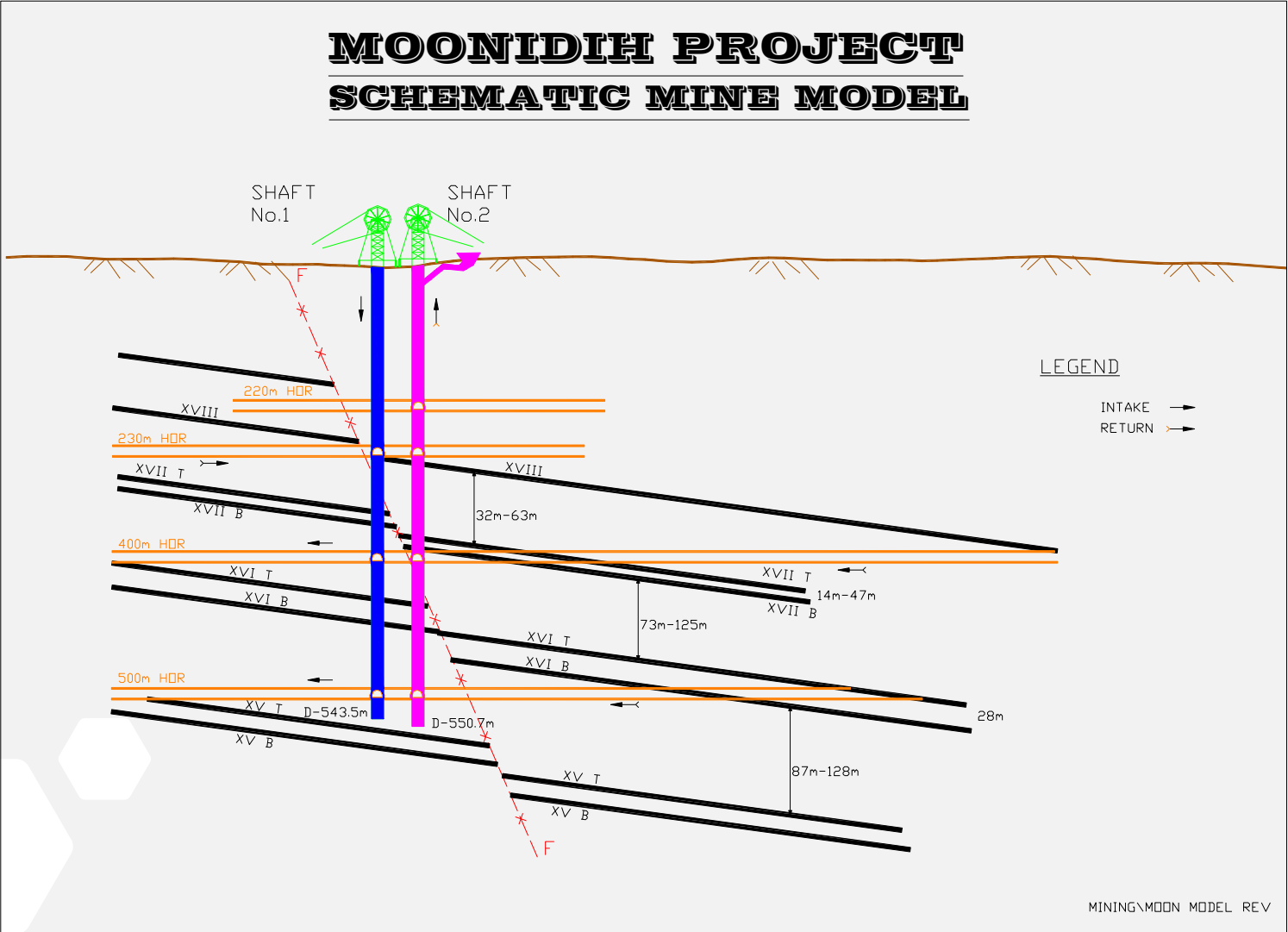
NO. OF SHEETS: 1/1

NO. OF DRGS: 1/1

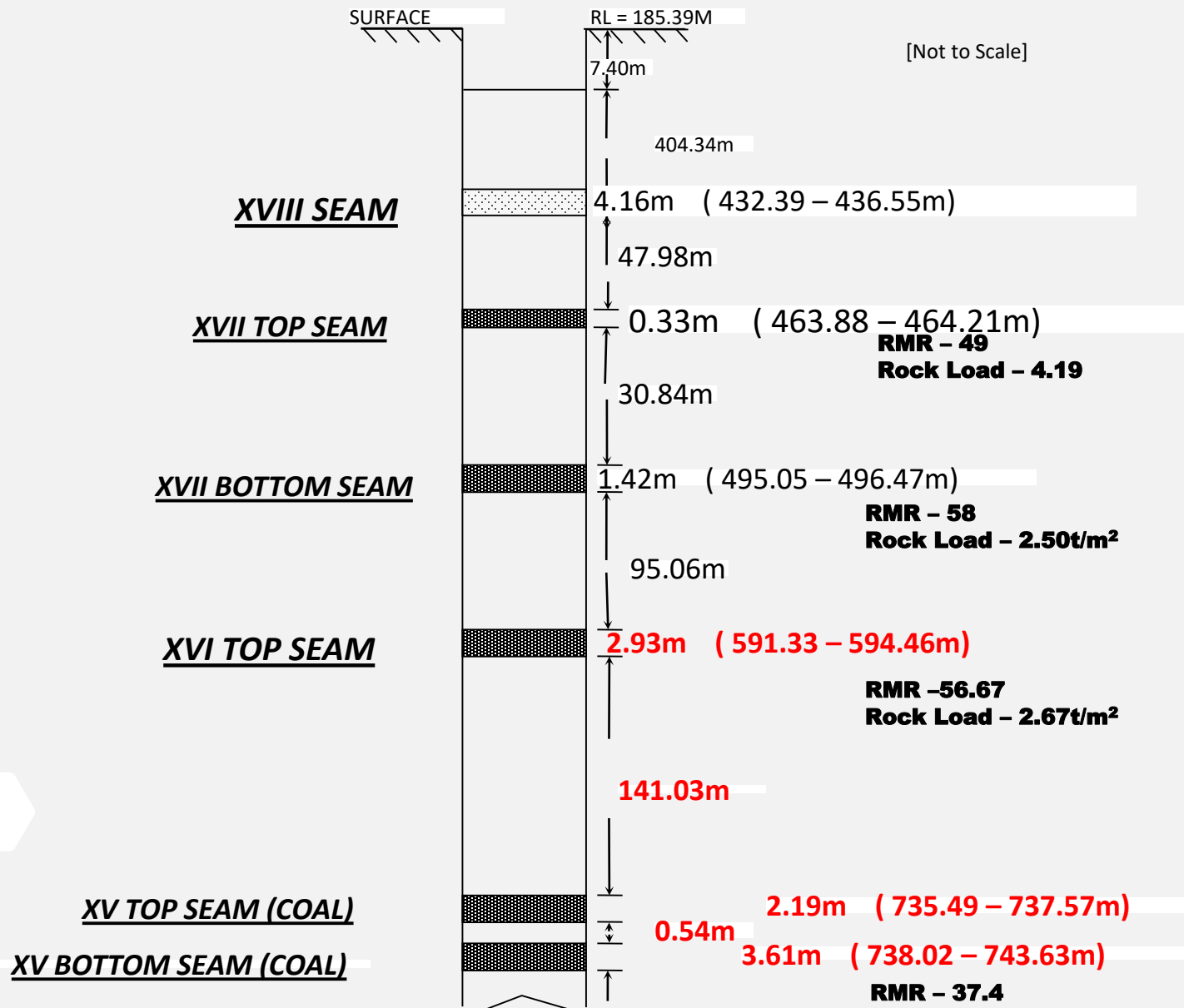
SLNO OF DRG: A/C No BCCL CLUSTERS II/109

CENTRAL MINE PLANNING & DESIGN INST. LTD. REGIONAL INSTITUTE NO -11, BHAMBAD

Moonidih schematic mine model



Standard Seam Sequence at Moonidih





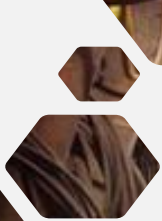
Methane at Moonidih

Make of Methane Gas at Moonidih

- Degree of Gassiness at Moonidih

- The gassiness of the seams at Moonidih Underground Project (XVIII to XV) is Degree – III;
- Gassy seam of degree – III means a coal seam or part thereof lying within the precincts of a mine not being an opencast working in which the rate of emission of inflammable gas per tons of coal produced exceeds ten cubic meters;
- Methane gas blowers have been encountered at various places while working XVIII, XVII Top, XVII Bot., XVI Top and XVI Comb. seams at Moonidih underground Project.





**Methane
presence in
sealed off area**

Sealed off areas in Moonidih Mine



Sl. No	Seam; no. of sealed off panels	Depth of working (m)	Panel name	Seam thickness (m)	Panel starting date	Date of finish of panel
1	XVIII Seam, <i>9 panels</i>	480	A1, A2, A3, A4, A5, A6, A6a, A7, A8	2.7	27.09.1994	04.09.1997
2	XVII (Top seam); <i>32 panels</i>	220-280	T1 to T6	1.7	20.09.1974	09.06.1980
			ML-I/1 to ML-I/7	-	28.08.1979	21.10.1990
			ML-II/1 to ML-II/6	-	25.07.1980	12.07.1991
			B32	-	24.07.1997	18.09.1998
3	XVII (Bottom seam), <i>2 panels</i>	280-400	C1, C2		11.09.1989	21.09.1995
4	XVI (Top seam), <i>11 panels</i>	400-500	ML-III/1, ML-III/2, ML-IV/1, ML-IV/2, D8, D9, D10, D11, D12, D13, D14A	2.8	14.10.1985	06.08.2010
5	XVI (Bottom seam), <i>6 panels</i>	400-500	E1, E2, E3, E4, E5, E6	-	11.09.1989	13.02.2004
6	XVI (Combined seam), <i>7 panels</i>	450-600	F1, F2, F3-A, F3-B, F4, F5, F6	2.7	05.09.1992	04.08.2008
Total = 67 panels						

Methane Concentration in all the sealed off areas is more than 70 %





PRESENT MINING OPERATIONS

Seam XVI(T)

Present Status of Seam XVI (T)

- The face operation of Seam XVI(T) is being done by INDU-ZMZ consortium
- The target was to achieve a production of 3.5 MTY in 5 Years by Long wall retreating with caving.
- D 15 longwall panel is being worked upon and this is the 3rd panel of the bid.
- *Gas emission varying from 22-35 cum/Min in tail gate of Longwall panels have been observed during the extraction process.*
- Two Road headers are deployed for Gate Road Development.

Methane emission from D 15 longwall panel is more than 40 m³/min



Methane Emission during depillaring Longwall Panels

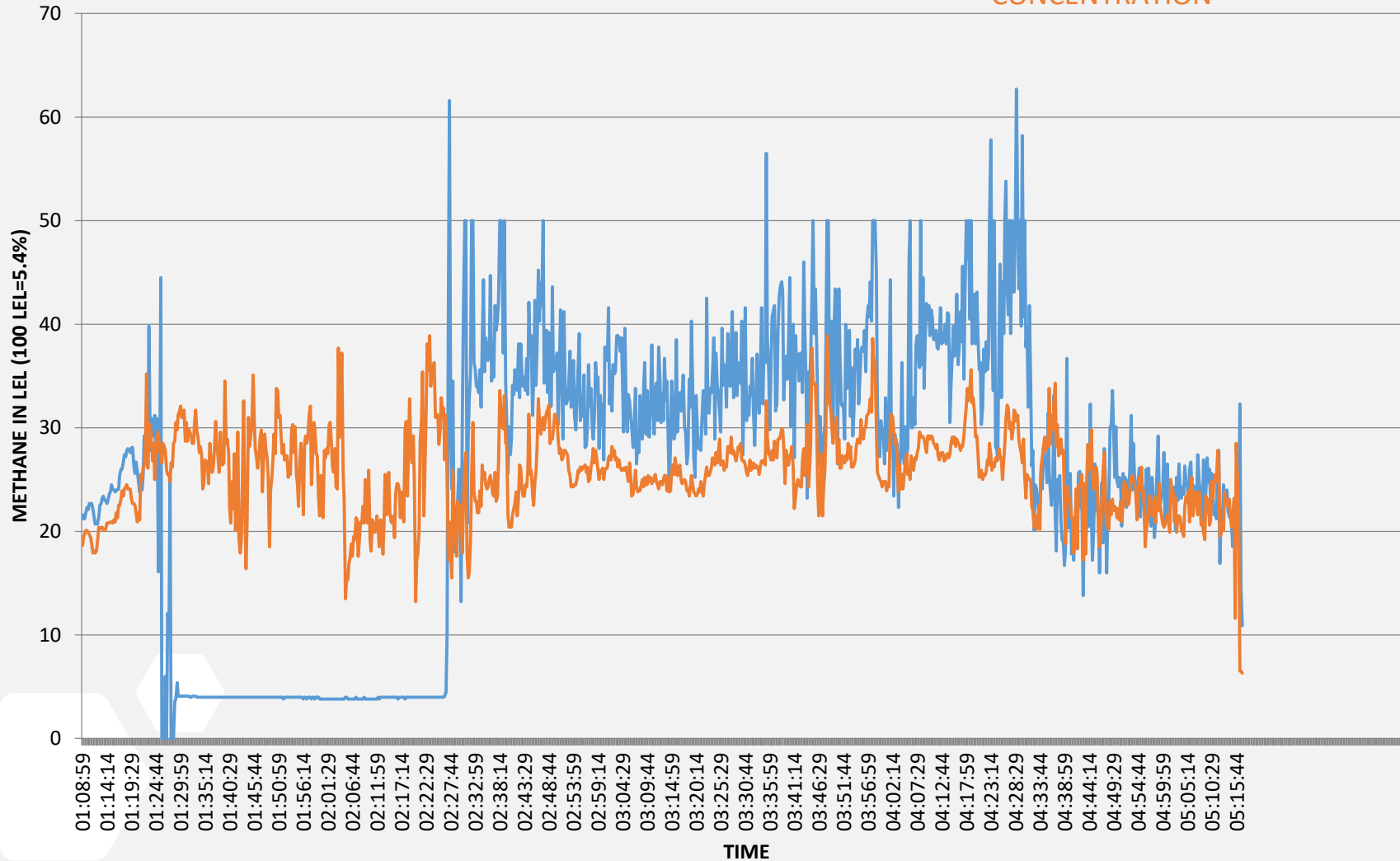
- Gas emission from goaf started after first local fall at 22 meter of face retreat.
- After mixing with ventilation air percentage of methane in top gate return air goes up to 1.7 – 2 %.
- During that time Production had to be suspended for some days owing to statutory restrictions.



D-15 Tail gate road Methane concentration

AFC SPROCKET RETURN
CONCENTRATION

100 METRES OUTBYE
CONCENTRATION

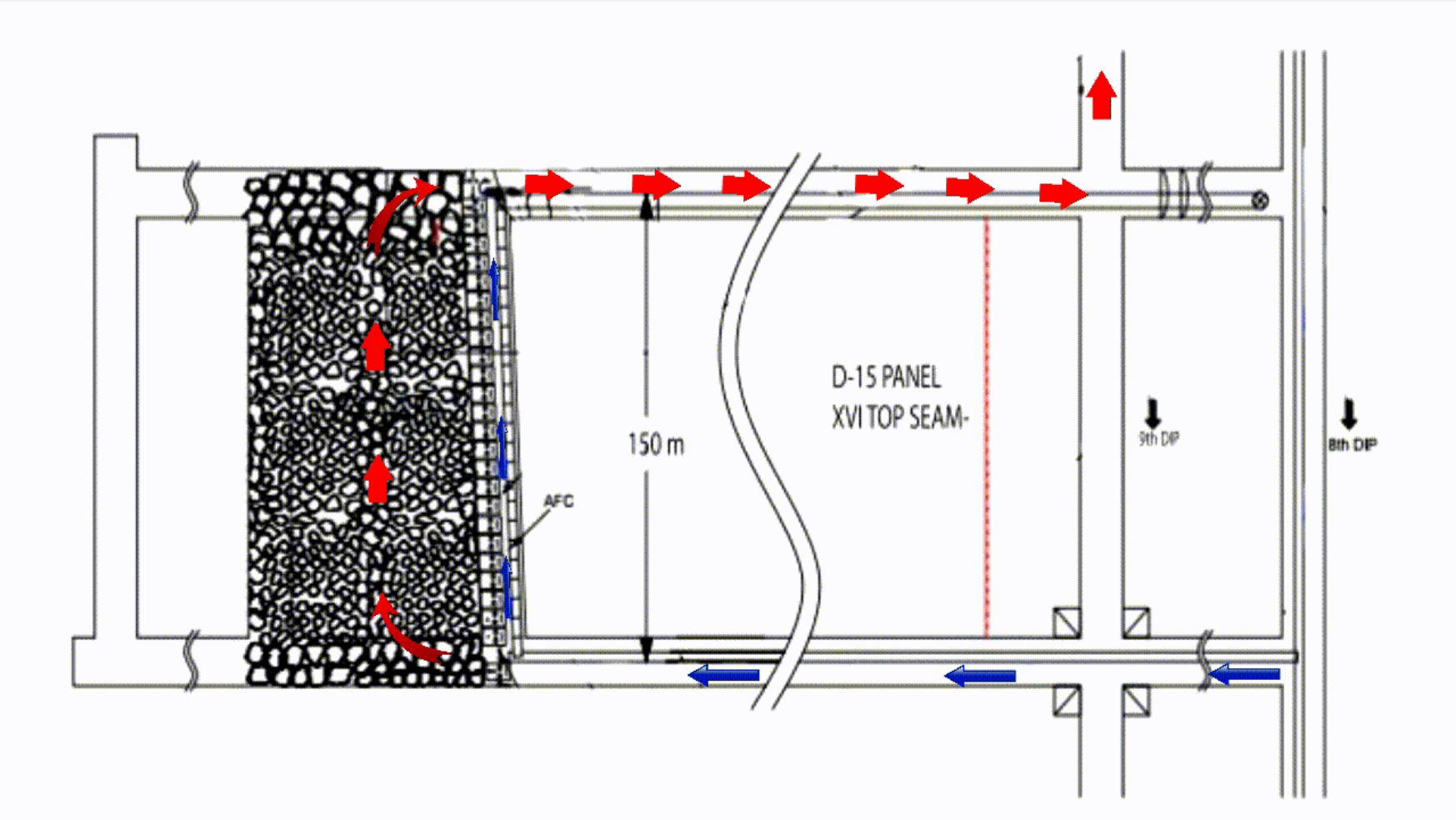


Salient observations during Methane emission in Longwall panels

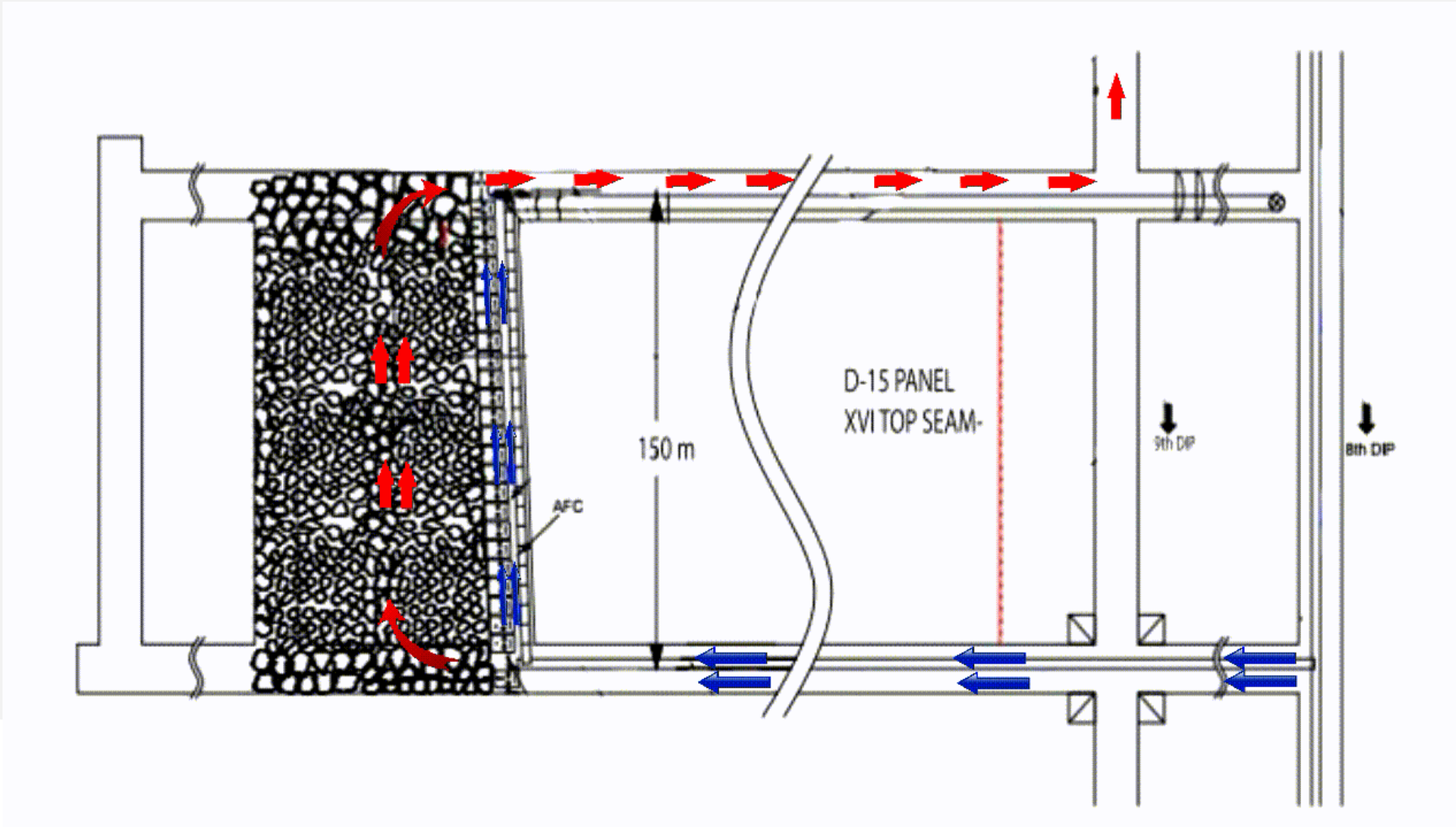
- During periodic weighting, it was observed that gas emission from goaf increases comparing to normal operation period;
- No major gas percentage increase observed due to coal cutting.
- With every advance of power supports fall of immediate roof takes place and thereby gas emission from goaf increases, resulting in frequent power interruptions due to LMD interlock
- With increase in quantity of air Methane concentration at upper tail gate corner increases



Normal Ventilation

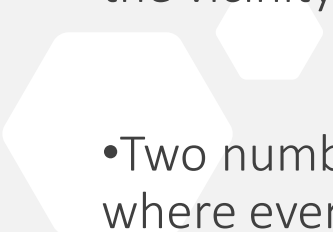


Air quantity in the panel was reduced / Increased

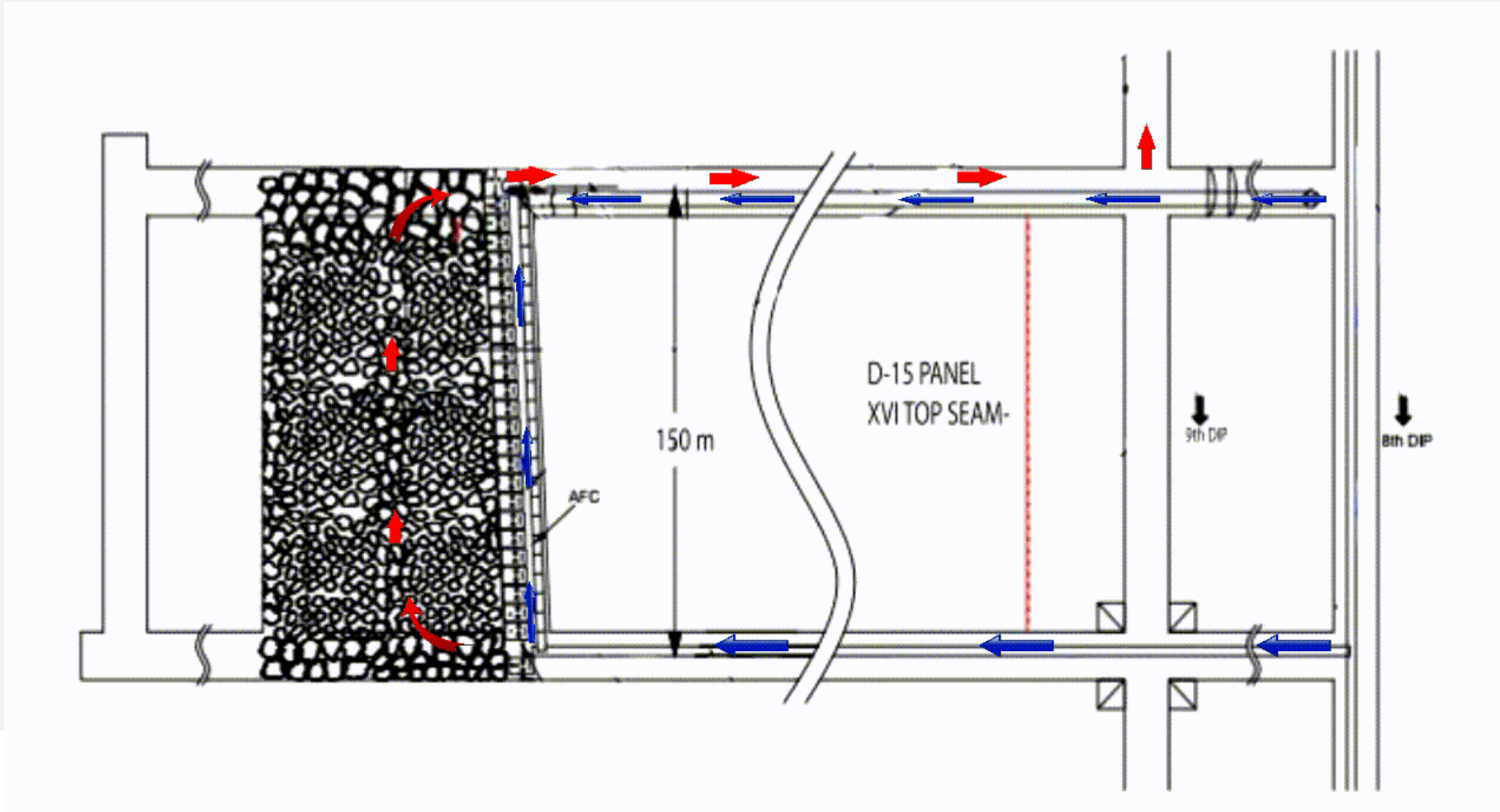


Systems adopted to dilute Methane gas and make safe the active working zone

- Back return system was introduced by way of line curtains.
- Auxiliary fan was installed in tail gate road which drew fresh air up to mixing point near AFC tail end for further dilution of gas.
- Air quantity in the main gate road was reduced to 1500 cum owing to the auxiliary fan installation in the same ventilation district. Thus leakage in the goaf was minimized.
- Two numbers of LMD were installed in the tail gate road of which one at AFC tail end and the second in the return route in the gate road so as to sense the air in the vicinity of last reach of shearer drum while cutting near tail end.
- Two numbers of compressed air blowers were installed to break methane layering where ever required.



Back return system of ventilation



SALIENT NOTINGS OF METHANE EMISSION FROM LONGWALL



- D 15 working is at a depth of 550 metres and methane in the return air has been estimated to be 40 m³/min
- With this amount of Methane it is very difficult to bring it down to statutory limit of 0.75 % in a single entry Longwall system
- Gas delays have resulted in more than 100 hours of production loss in the month of April so far
- XV Seam working is at depth of 650 metre and beyond and there also huge influx of Methane is expected

METHANE MITIGATION BY DRAINAGE WILL BE A BOOST TO THE SAFETY AND PRODUCTION ENVIRONMENT



UPCOMING MINING OPERATIONS

Seam XV

Salient features

- XV seam is split into two sections i.e XV Top & XV Bottom.
- After extraction of Top section, XV Bottom section shall be worked by Long wall Retreating (caving) under settled goaf of XV Top section. A parting of minimum 3mtrs shall be maintained between Top & Bottom sections.
- XV Seam will be worked under the goaved out area of XVIII, XVII Top and XVII Bot. seams which are filled up with gas.
- It is proposed to work five panels in XV Top section & five panels in XV Bottom during the contract period.
- The lengths of these panels vary from 878 mtrs to 3238 mtrs with a face width of 250 mtrs.



Salient features of the project (XV seam)



S.No.	Panel No.	Section	Face length(m)	Panel length(m)	Reserves(LT)
1	1	TOP	250	928	9.54
2	2	TOP	250	1987	20.42
3	3	TOP	250	2408	24.75
4	4	TOP	250	2930	30.12
5	5	TOP	250	3238	33.29
6	1	BOTTOM	239.1	878	8.64
7	2	BOTTOM	239.1	1938	19.07
8	3	BOTTOM	239.1	2359	23.22
9	4	BOTTOM	239.1	2881	28.36
10	5	BOTTOM	239.1	3189	31.39
TOTAL					228.8

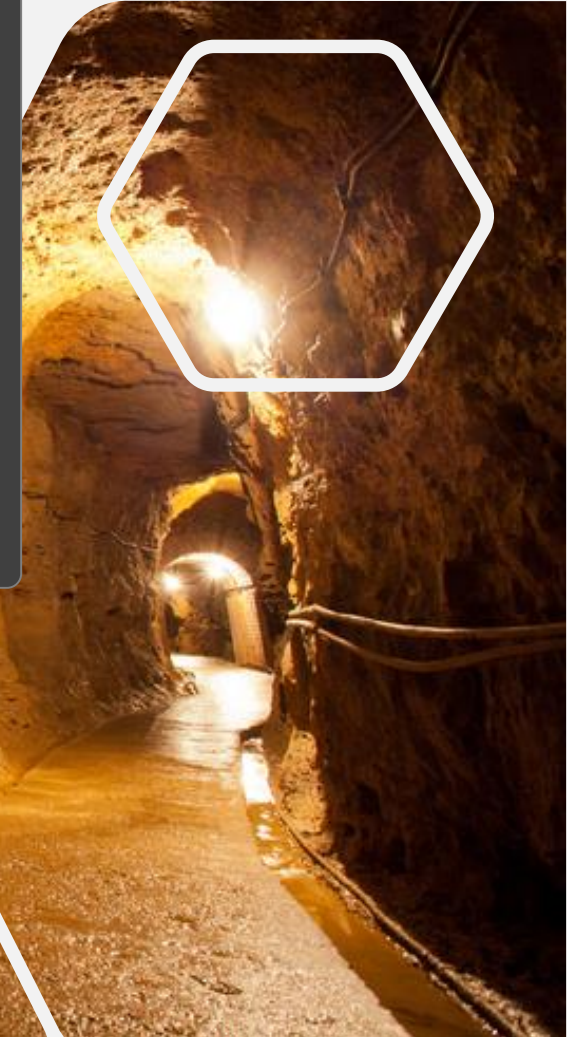
Status of Development in XV Seam Project



- Ventilation air shaft has been completed
- Two number of inclines have been developed upto 1000 m and 850 m respectively
- Roadheader is deployed in Incline-1 and Incline -2 is being developed using drilling and blasting.
- Two number of BOLTER-MINERS(1st in CIL) have been deployed for in seam development
- Three levels have been developed and trunk roadways for longwall is in progress.



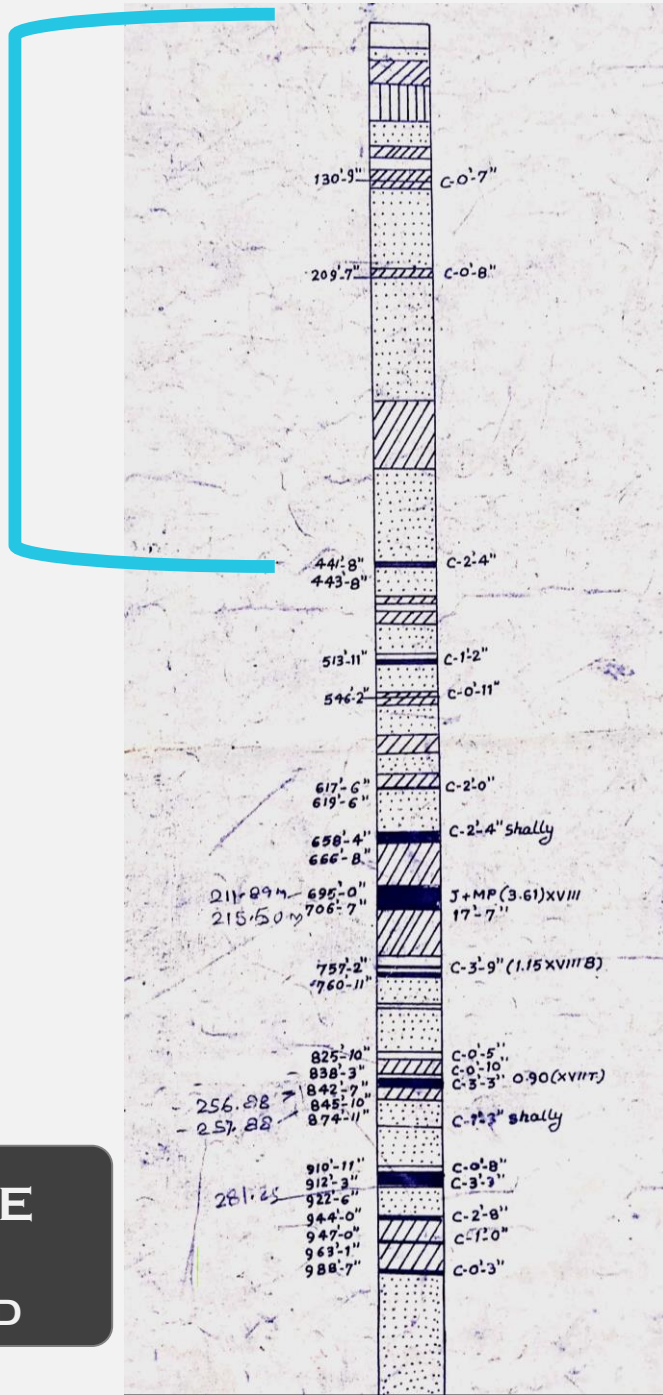
Methne Fire at Incline-1



Methane at Incline

- Methane got ignited due to friction from Roadheader picks
- Methane was coming out from the cracks in floor
- As the Incline has progressed several cracks with blowers have been intercepted
- Taking cue from the incident of fire, cement injection technique has been adopted

On the date of fire the Incline-1
 passed through the depicted
 stratigraphic column



INDEX

	Medium grained sand stone
	Medium to coarse grained sand stone
	Shales
	Intercalations of sand stone and shales
	Carbonaceous sandy shales
	Coal
	Jhama and mica peridotite
	Fault

BORE HOLE PLATE NO. MND/NCCJ-18/99/1 DT-12.1.99

**GRAPHIC LOGS OF BOREHOLE
 NCCJ-20
 MOONIDIH BLOCK JHARIA COALFIELD**

Cement Injection technique

- Make of pump is SIP – 100
- Blow out pressure is 2.5 bar and flow rate is 180 lpm
- Constituents of the mixture are sodium silicate and cement in the ratio 4: 1
- Hole of dia 30 mm & length 1.2 metre is drilled and then a perforated pipe of length 1 metre is grouted with cement capsule
- Cement is injected into the pipe till blow out is observed
- *By this method gas zones of over 70 metres length have been negotiated successfully*


Conclusion


- Possibility of gas traps does exist as observed in incline-1 & Longwall.
- Gas is released through cracks, slips and faults
- High in-situ gas content of XV (Top) and XV (Bottom) with a parting of 3 meters between them will be difficult to extract without methane drainage.
- High and Stable methane content in sealed off areas may also supplement the methane drainage project.
- The measures adopted for Methane mitigation so far are only temporary in nature.
- *Methane Drainage is crucial for safe & productive environment.*






Thank You

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Your suggestions!

