OPTIMUM WIDTH
OF
LONGWALL FACES
IN
HIGHLY GASSY COAL MINES

PART 2

PRAMOD THAKUR

CONSOL ENERGY™

EXTENDED LONGWALLS

ADVANTAGES:

1. **IMPROVED SAFETY; LOWER INJURY RATE**

1. **IMPROVED RECOVERY OF COAL**

1. **IMPROVED PRODUCTIVITY – REDUCED COST PER TON**

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EXTENDED LONGWALLS

DISADVANTAGES:

1. **VENTILATION & METHANE CONTROL**
2. **GROUND CONTROL**
3. **RESPIRABLE DUST CONTROL**
4. **GEOLOGIC ANOMALIES**
5. **EMERGENCY ESCAPE**

LONGWALL WIDTH

DEPENDS ON:

(i) LONGWALL FACE DEPENDENT VARIABLES

(ii) LONGWALL GOB DEPENDENT VARIABLES

LONGWALL FACE DEPENDENT VARIABLES

(a) METHANE EMISSION RATE – DEGREE OF DEGASIFICATION

(b) VENTILATION AIR AT TAIL GATE

(c) GAS LAYERING INDEX ≥ 5.00

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LONGWALL GOB DEPENDENT VARIABLES

(a) RATE OF FACE ADVANCE

(b) SPECIFIC METHANE EMISSIONS OF GOB

(c) EFFICIENCY (& COST) OF GOB GAS CAPTURE

(d) BLEEDER AIR QUANTITY

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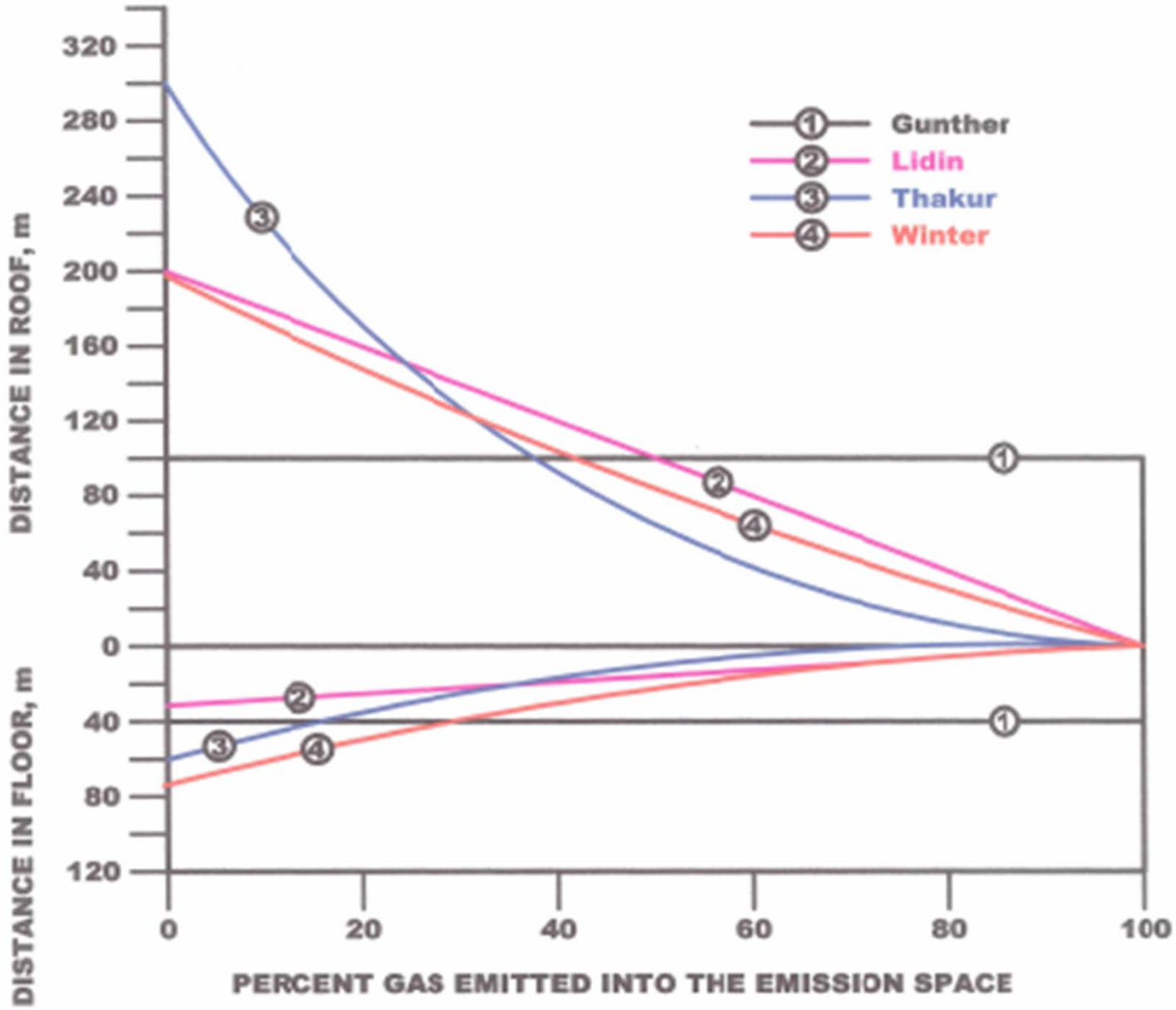

Figure 1. Vertical Limits of the Gas Emission Space

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SPECIFIC METHANE EMISSIONS OF GOB

- TOTAL THICKNESS, GAS CONTENT & PROXIMITY OF COAL SEAMS IN THE GAS EMISSION SPACE
- WIDTH OF LONGWALL PANEL
- GEOLOGICAL DISTURBANCES
- THICKNESS & LOCATION OF NON-COAL STRATA IN THE GAS EMISSION SPACE

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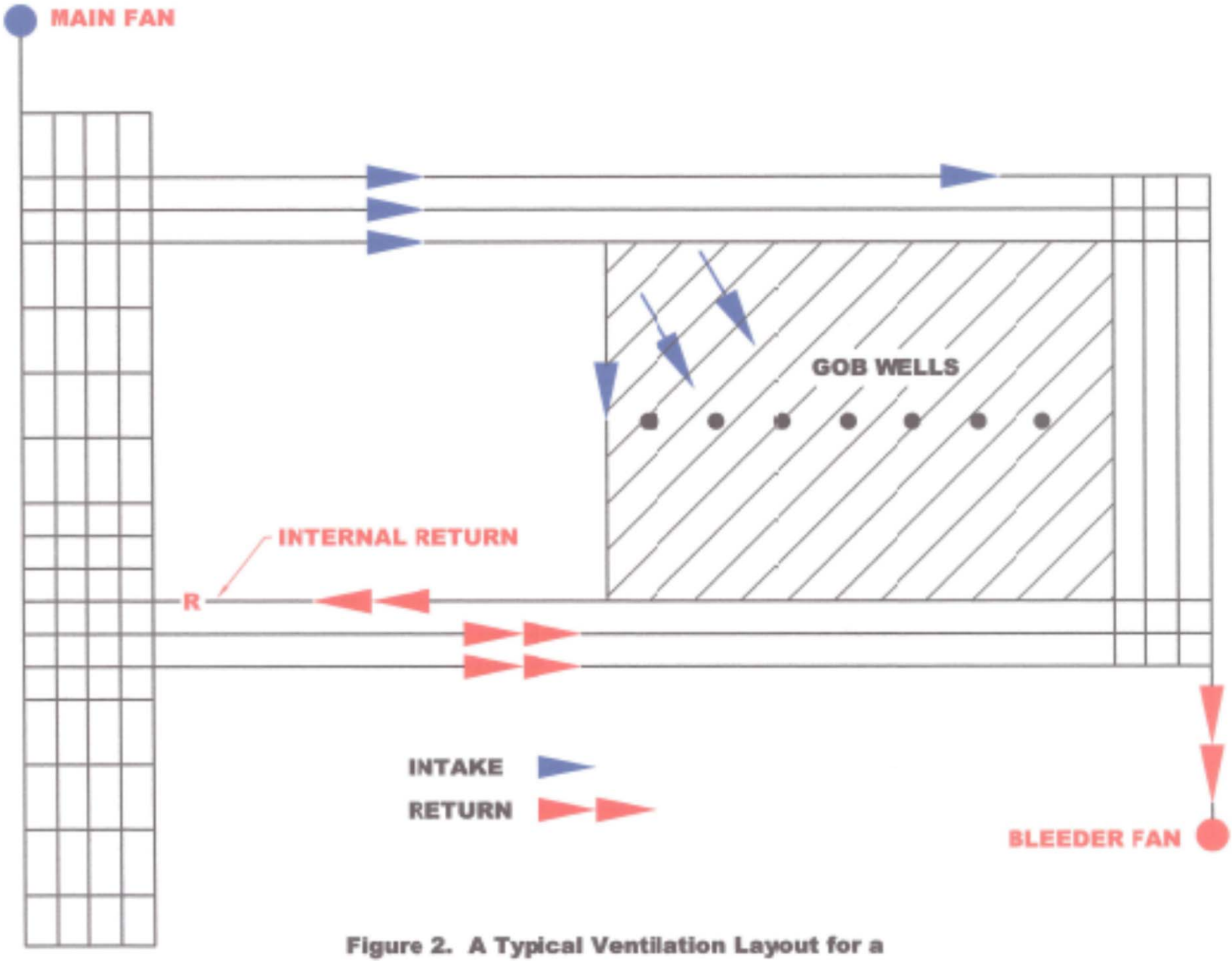

Figure 2. A Typical Ventilation Layout for a Longwall Face with Vertical Gob Wells

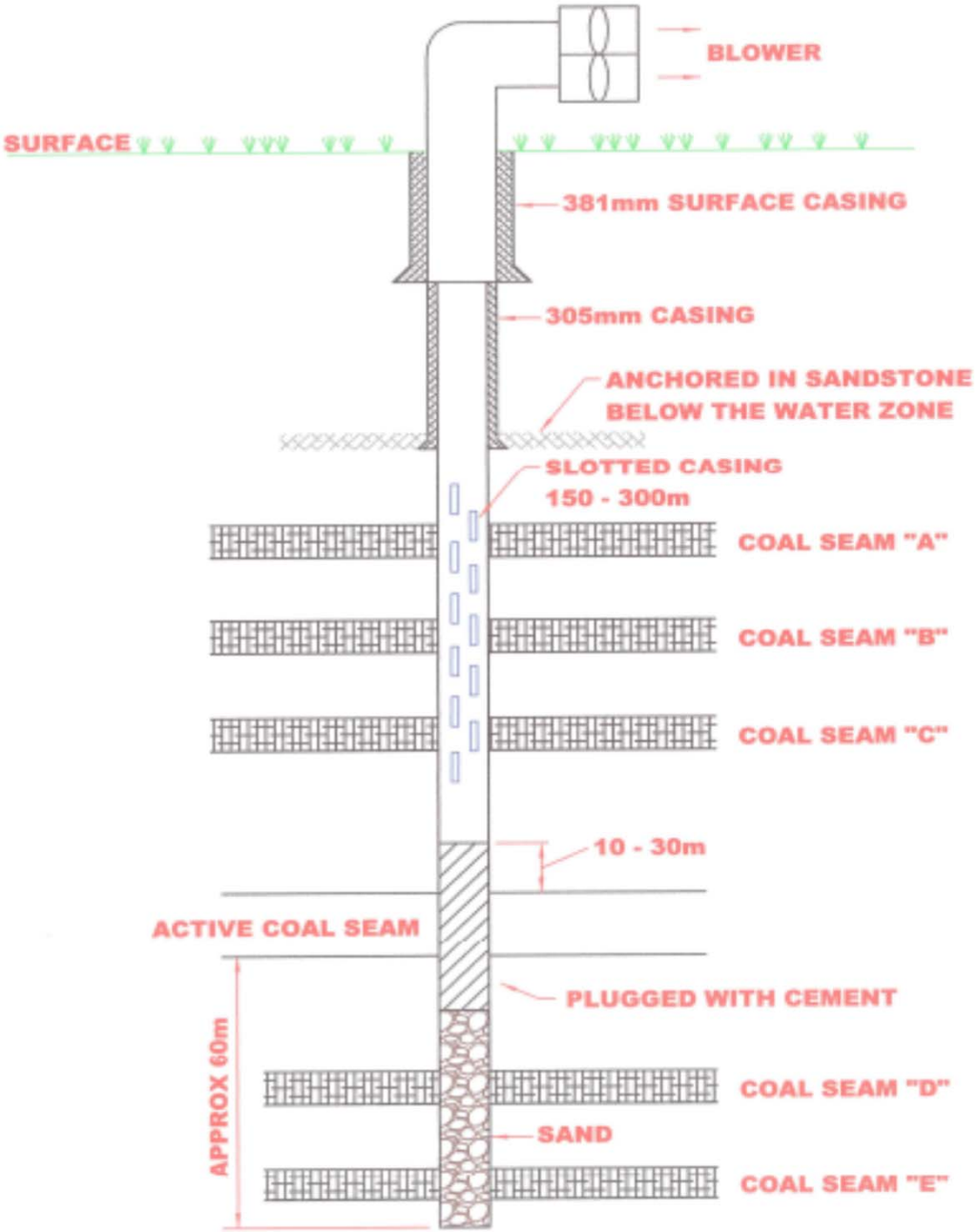

Figure 3. Vertical Cross-Section of a Typical Gob Well

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OPTIMAL DESIGN OF GOB GAS DRAINAGE

- SIZE OF GOB WELL & SIZE OF VACUUM PUMPS
- DISTANCE OF GOB WELLS FROM TAIL GATE
- SPACING OF GOB WELLS ON THE PANEL (SPECIFIC GOB EMISSION & RATE OF MINING)
- COST OF INSTALLING A GOB WELL

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SIZE OF GOB WELLS AND PRODUCTION

CASING DIAMETER (I.D.)	GAS PRODUCTION
229 mm	0.07 – 0.09 Mm^3/day
305 mm	0.13 – 0.14 Mm^3/day
381 mm	0.21 – 0.23 Mm^3/day

PRODUCTION ASSISTED WITH MATCHED BLOWERS WORKING AT 24 kpa (appromimate)

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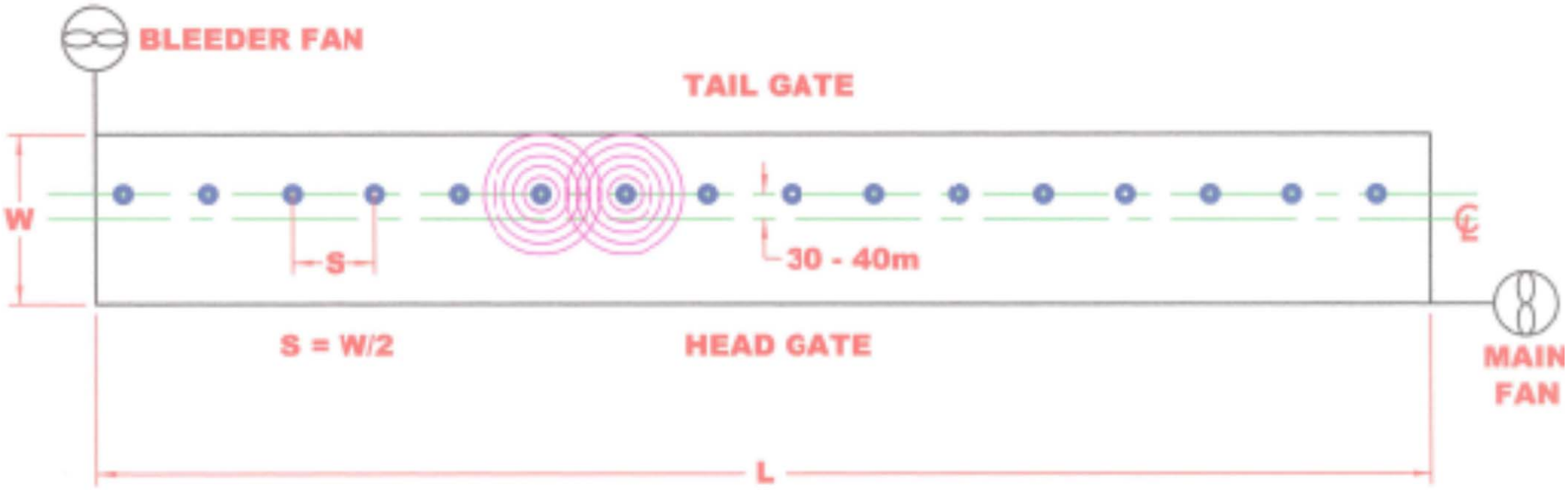

Figure 4. Optimum Layout of Gob Well on a Longwall Face

LOCATION

- **BEST LOCATION: 30m FROM CNTERLINE TOWARDS TAIL GATE**
- **GOB WELLS ON THE HEAD GATE SIDE VERY INEFFICIENT**

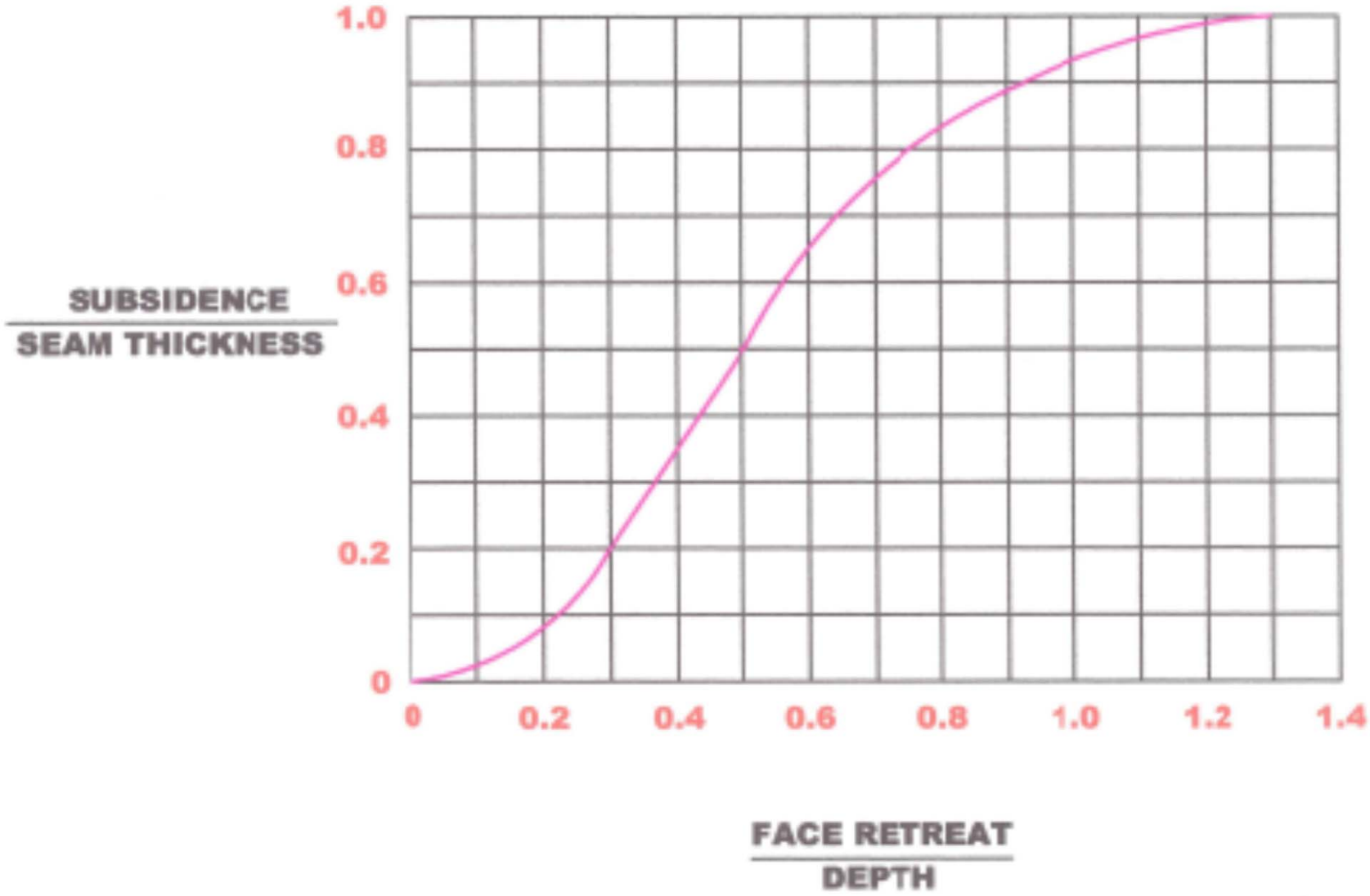

Figure 5. Subsidence Over the Gob as a Function of $\frac{\text{Length of Gob}}{\text{Depth}}$

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Table 1. Specific Emissions for Longwalls

WIDTH OF LONGWALL FACE (m)	SPECIFIC GAS EMISSION (Mm^3/hectare)
135	1.77
180	2.12
225	2.34
270	2.55
315	2.83

OPTIMUM WIDTH OF LONGWALL IS REACHED WHEN

(a) GOB WELL GAS CAPTURE IS MOST EFFICIENT

(b) NUMBER OF GOB WELLS/PANEL IS THE MINIMUM

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ASSUMPTIONS FOR OPTIMIZATION

(a) RATE OF EXTRACTION = 0.4 hectare/day

(b) LONGWALL PANEL IS 3000m LONG & HAS 2 GOB WELLS NEAR THE SET-UP ENTRY

(c) A TYPICAL GOB WELL PRODUCES 0.13 Mm^3/day

(d) 70 – 80% OF GOB GAS IS CAPTURED

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Table 2. Number of Gob Wells Versus Longwall Width

WIDTH OF FACE (m)	NUMBER OF GOB WELLS	SPACING/WIDTH (s/w)
135	24 + 2	0.93
180	26 + 2	0.64
225	28 + 2*	0.48
270	32 + 2*	0.35
315	36 + 2*	0.26

*Total number of gob wells could be slightly higher because of declining capture efficiency.

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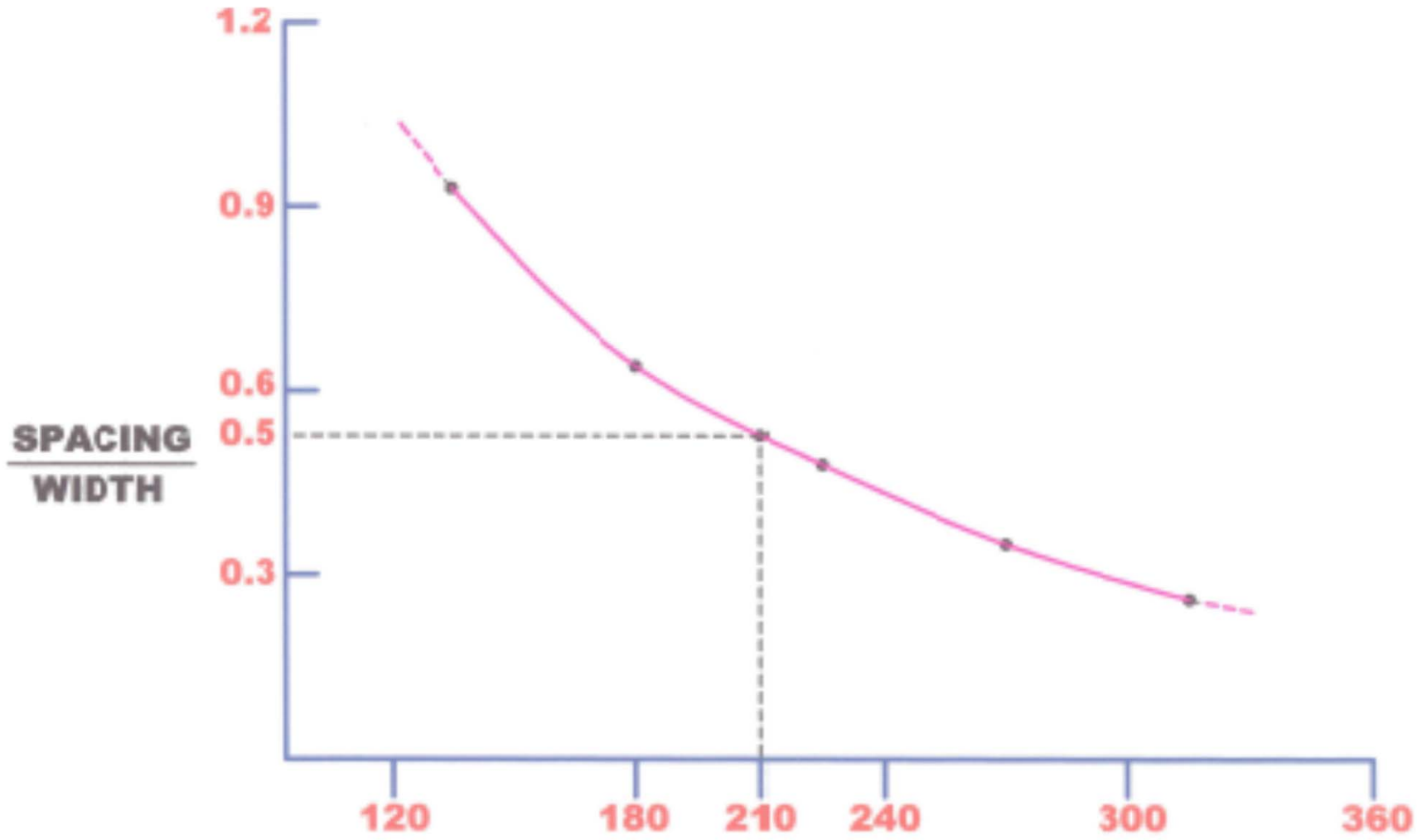

Figure 6. Optimal Spacing of Gob Wells on a Longwall Face

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CONCLUSIONS:

1. OPTIMUM WIDTHS OF LONGWALL FACES MUST BE CALCULATED USING LOCAL DATA

2. OPTIMUM WIDTH OF LONGWALL IS REACHED WHEN GOB WELL SPACING EQUALS HALF-WIDTH OF PANEL

3. OPTIMUM WIDTH OF LONGWALL IN HIGHLY GASSY MINES IS LIMITED TO 210-240M

   FOR A MINING RATE OF 0.4 hectare/day

   FACE EMISSIONS ≥15m^3/min

   SPECIFIC GOB EMISSIONS≥2Mm^3/ha

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