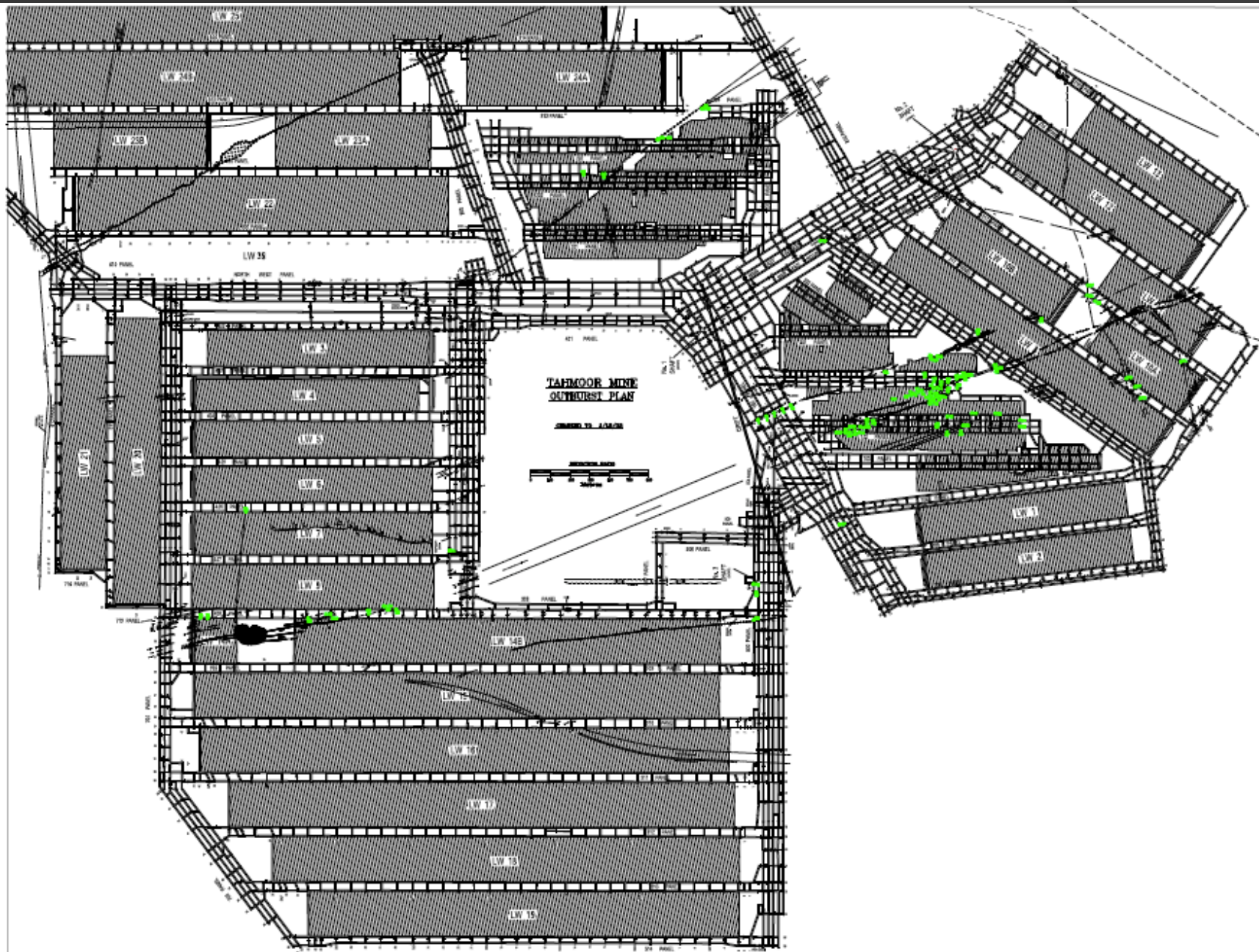


RAISING THE OUTBURST
THRESHOLD
AT TAHMOOR COLLIERY

TAHMOOR OUTBURST HISTORY

- ◉ SOME 90 OUTBURSTS BETWEEN 1981 AND 1992
- ◉ 1 FATALITY IN 1985 (MINER DRIVER CUTTING DYKE, 400t OF COAL INVOLVED)
- ◉ WITH WESTCLIFF, PIONEERED OUTBURST MANAGEMENT PLANS IN EARLY 1990'S
- ◉ STARTED PRE-DRAINAGE IN EARLY 1990'S



PRE-DRAINAGE

- ◉ INITIALLY ROTARY DRILLING TARGETING STRUCTURES. WHILST SOMEWHAT “HIT & MISS”, IT WAS QUITE EFFECTIVE – OUTBURSTS CEASED.
- ◉ DIRECTIONAL DRILLING INTRODUCED MID-1990’S, FOR ALL DEVELOPMENT ROADS. VERY EFFECTIVE – MANAGEMENT AND WORKFORCE WERE CONFIDENT OUTBURST PROBLEM WAS VIRTUALLY SOLVED.

DRAINAGE PROBLEMS – “TIGHT” COAL

1990'S

- ⦿ OCCASIONALLY ENCOUNTERED A PILLAR THAT WOULDN'T DRAIN NORMALLY. USUALLY RECTIFIED BY RE-DRILLING AT MUCH CLOSER SPACING &/OR MORE TIME ON DRAINAGE.

ABOUT 2000

- ⦿ STARTED TO ENCOUNTER SIGNIFICANT ZONES THAT WOULDN'T DRAIN, EVEN @ 5m SPACING AND 6 MONTHS DRAINAGE TIME.
- ⦿ MAJOR LW CONTINUITY PROBLEMS – MINE BECOMING NON-VIABLE.

“TIGHT” COAL

- GAS TYPICALLY (BUT NOT NECESSARILY) >85% CO₂
- NOT LIKE USUAL BULLI SEAM COAL – MINIMAL BEDDING OR CLEAT (“BLACK CONCRETE”). SOMETIMES CALCITE INCLUSIONS.
- TRIALLED SLOTTING AND FRACCCING, WITHOUT SUCCESS

GRUNCHING EXPERIENCE

- INTRODUCED AS A MEANS OF REMOTE MINING FOR ABOVE-THRESHOLD COAL (AS PER 1994 SECTION 63)
- >3km OF ROADWAYS GRUNCHED WITHOUT INJURY
- FIRED >1,000 ROUNDS BUT NO OUTBURSTS OCCURRED IN COAL CONTAINING UP TO 14m³/tonne

GRUNCHING PROBLEMS

TECHNICALLY SUCCESSFUL BUT :

- ◉ NOT ECONOMICALLY SUSTAINABLE AT 2-3m ADVANCE PER SHIFT
- ◉ ONGOING CONCERNS RE SAFETY RISKS OF HANDLING EXPLOSIVES CONTINUALLY
- ◉ MAJOR PROBLEMS WITH AVAILABILITY OF PERMITTED EXPLOSIVES. THE ONLY AVAILABLE P5 WAS VERY UNRELIABLE. (TAHMOOR COULD GENERALLY USE P1 BECAUSE OF CO₂ CONTENT).

HOW TO RAISE THE THRESHOLD?

- ⦿ “PROBLEM” WAS THAT BECAUSE THE EXISTING THRESHOLD WAS SO SUCCESSFUL, THERE WAS EXTREME RELUCTANCE TO MAKE ANY CHANGE.
- ⦿ RESEARCH WITH CSIRO – COULD OTHER OUTBURST PARAMETERS BE APPLIED?
- ⦿ DETAILED REVIEW OF ALL PREVIOUS OUTBURSTS
- ⦿ WENT BACK TO RIPU LAMA’S ORIGINAL PROPOSALS

RESEARCH – OTHER OUTBURST PARAMETERS

- ◎ CSIRO MATHEMATICAL MODEL INCORPORATES MULTIPLE PARAMETERS, eg COAL STRENGTH, STRESS.
- ◎ COULD THE INCREASED STRENGTH OF THE “TIGHT” COAL BE THE BASIS FOR A HIGHER THRESHOLD?
- ◎ RESEARCH WAS UNABLE TO COME UP WITH A DEFINITIVE ANSWER THAT COULD BE APPLIED WITH THE SAME DEGREE OF CONFIDENCE AS THE CURRENT THRESHOLDS.

REVIEW OF ALL PAST OUTBURSTS

- REVIEWED AND SORTED ALL 90 OUTBURSTS
- OF THE 90, ABOUT 10 WERE CATEGORISED AS LIFE-THREATENING (>10t)
- ALL THESE 10 OCCURRED ON FAULTS OR DYKES!
- THE LARGEST FIVE WERE ALL ON DYKES
- THE NEXT FIVE LARGEST WERE ON DYKES OR FAULTS BIGGER THAN HALF SEAM THICKNESS
- CONCLUSION:
TAHMOOR'S DRILLING PROGRAM WOULD FIND ALL THE STRUCTURES THAT COULD CAUSE LIFE-THREATENING OUTBURSTS.

RIPU LAMA'S WORK RE-VISITED

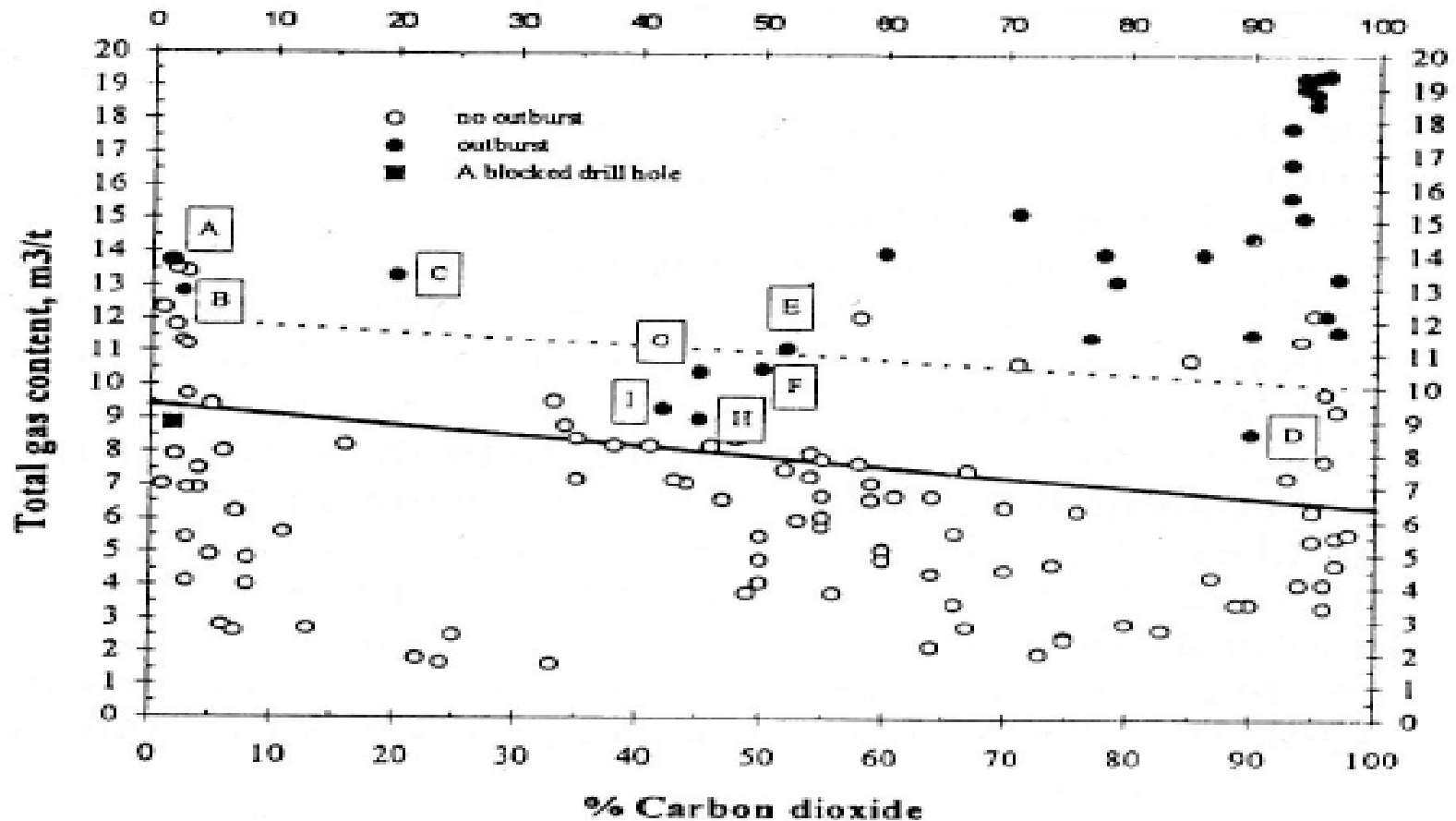


Fig. 10 Total gas content data close to structures*, Tahmoor and West Cliff Mines

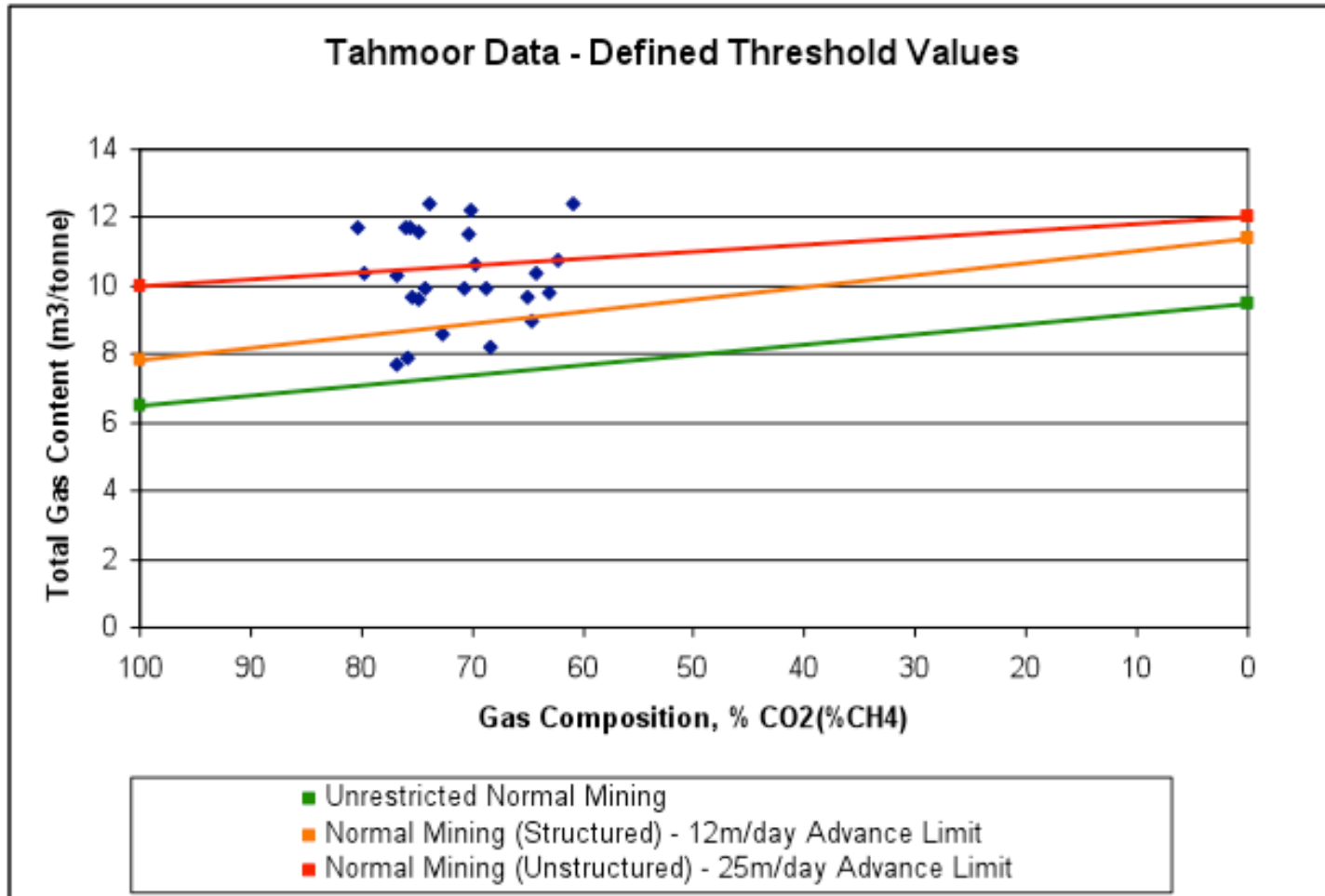
LAMA'S RECOMMENDATIONS NOT APPLIED IN SECTION 63

- IF ADVANCE RATES ARE LOWER (10-12m/DAY), THRESHOLDS CAN BE INCREASED BY 20%.
- IF THERE ARE NO STRUCTURES WITH 5m OF FACE, THRESHOLD CAN BE 10m³/t (CO₂) AND 12m³/t (CH₄) - DOTTED LINE ON THE GRAPH.

THE PROPOSAL

- APPLY RIPU LAMA'S OTHER THRESHOLD LINES
- HAD CONFIDENCE THAT THIS WAS SAFE AT TAHMOOR BECAUSE :
 - EXTENSIVE GRUNCHING EXPERIENCE (NO OUTBURSTS IN "TIGHT" COAL UP TO 14m³/t)
 - ANALYSIS OF PAST OUTBURSTS – ALL PAST DANGEROUS OUTBURSTS WERE ON STRUCTURES THAT DRILLING WOULD LOCATE.

THE NEW THRESHOLDS



THE OUTCOMES

- ◎ TAHMOOR SURVIVES !
- ◎ WHEREVER POSSIBLE COAL STILL DRAINED TO BELOW THE LOWEST THRESHOLDS
- ◎ MANY KM'S OF DEVELOPMENT HAVE BEEN COMPLETED IN COAL ABOVE THE ORIGINAL THRESHOLD, WITHOUT A SINGLE OUTBURST.

THE BIG QUESTION

CAN OTHER BULLI SEAM
MINES SAFELY RAISE
THEIR THRESHOLDS ?