

A FIELD STUDY OF US LONGWALL COAL MINE VENTILATION AND BLEEDER PERFORMANCE

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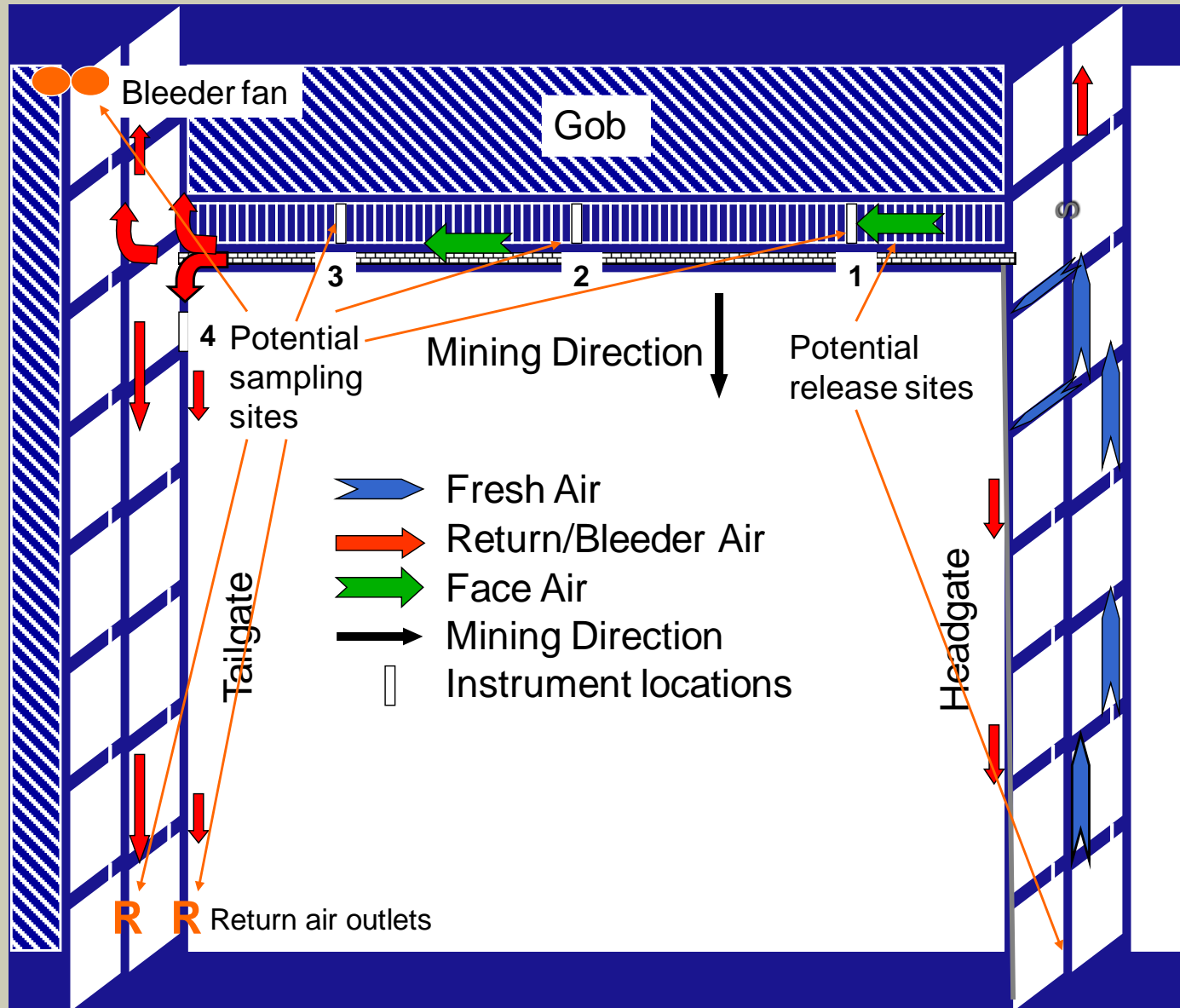


OUTLINE

- Problem statement
- Research design and goals
- Methodology
 - Study site
- Discussion and results
- Summary and conclusions
- Acknowledgements



PROBLEM STATEMENT-RESEARCH GOALS

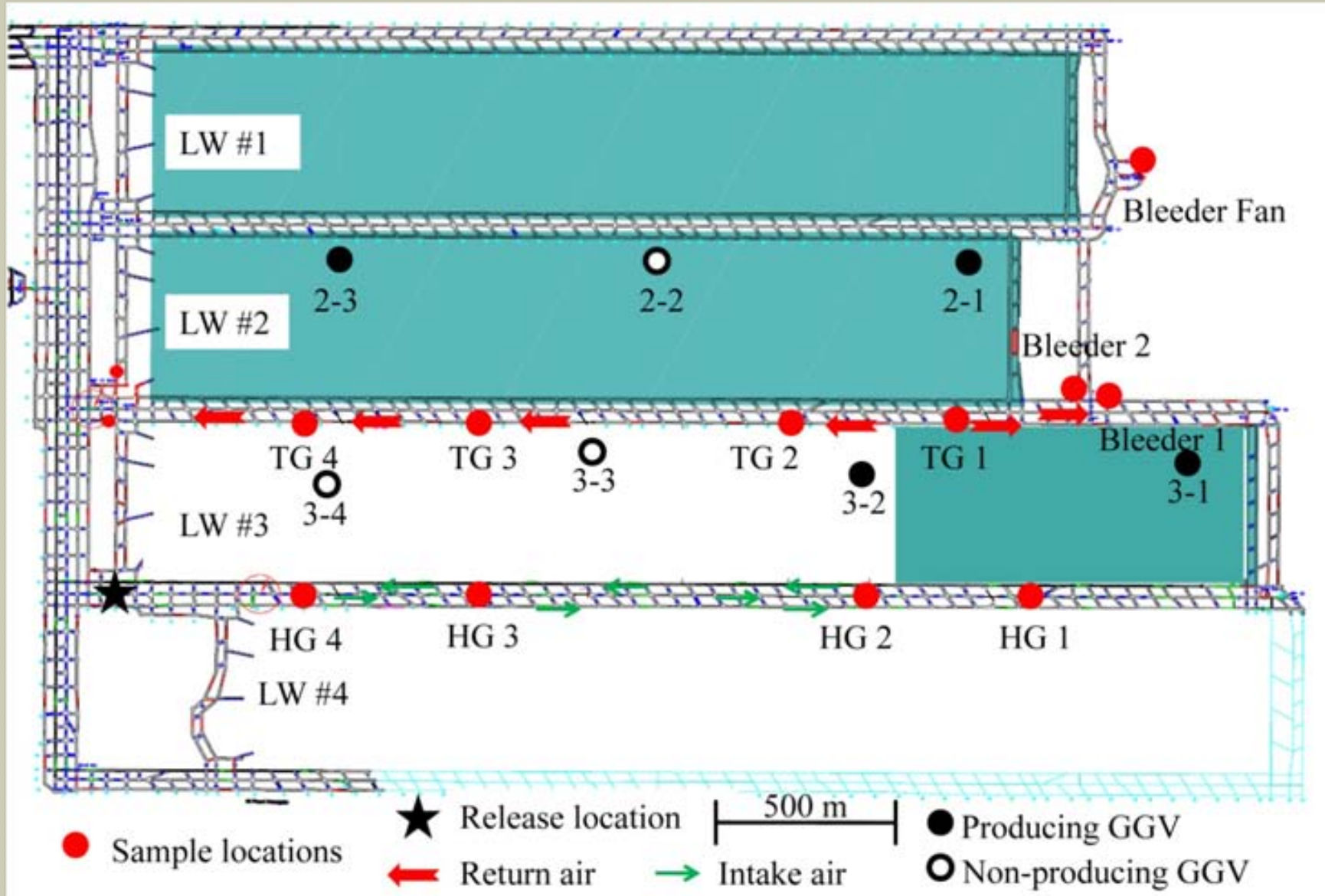


EXPERIMENTAL METHODOLOGY

- USBM tracer gas studies in underground coal mines, 1970's-1980's.
- NIOSH studies, 1990's to about 2000.
- ASTM standards for vents and mine voids, 1999, 2000.
- Single tracer gas
- Gas released as a slug
- Successive monitoring over path length



STUDY SITE-TEST 1

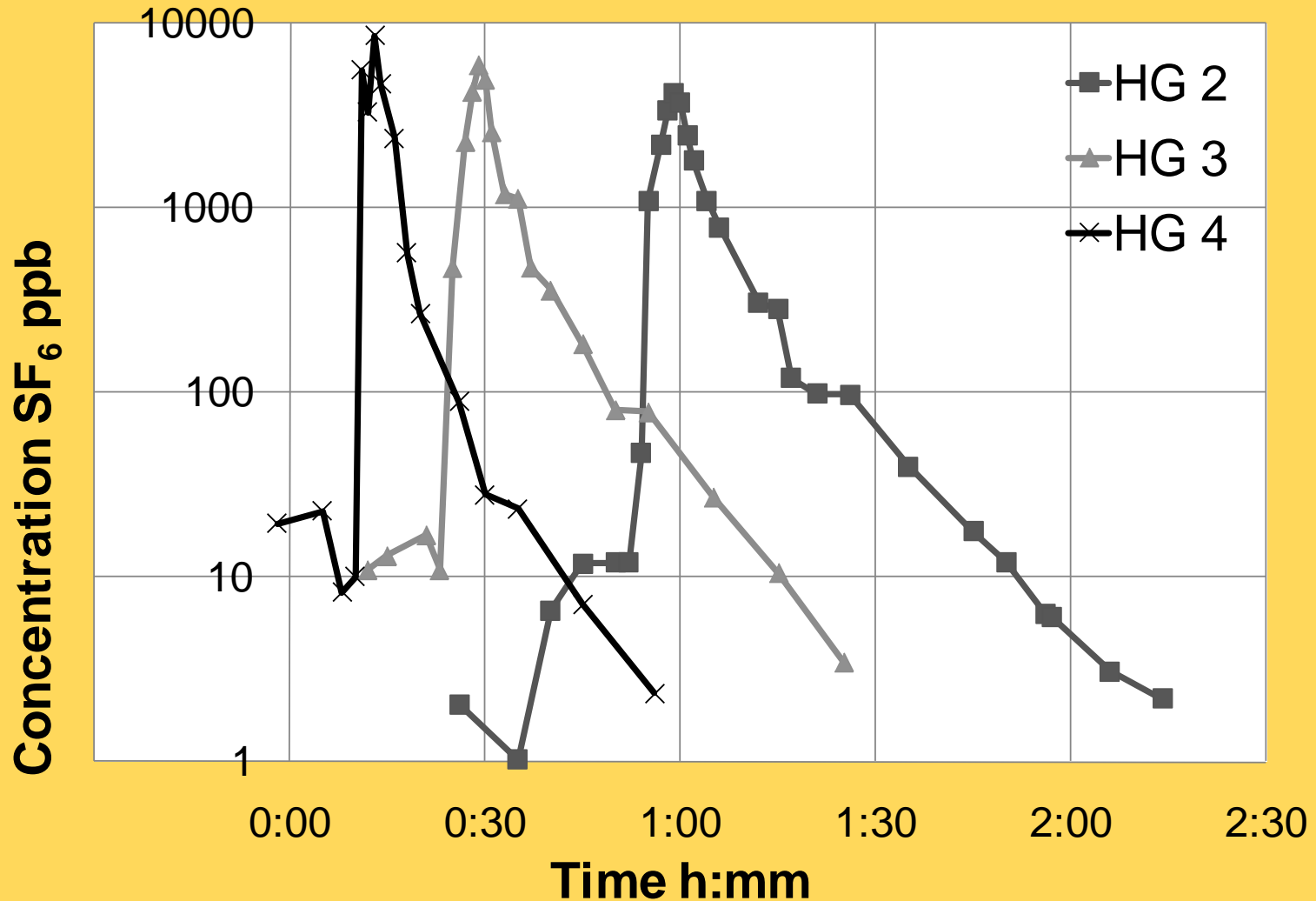


SF6 CONCENTRATION DETERMINATIONS

- Gas samples retrieved in bottle samples.
- Samples introduced to a gas chromatograph at the mine site or at the Pittsburgh laboratory.



RESULTS-HEADGATE, TEST 1



TRACER GAS VOLUME DETERMINATIONS

$$Q = \frac{Q_g}{C_{av}T_t}$$

Q = airflow, cfm

Q_g = quantity, cu ft

C_{av} = average, ppb

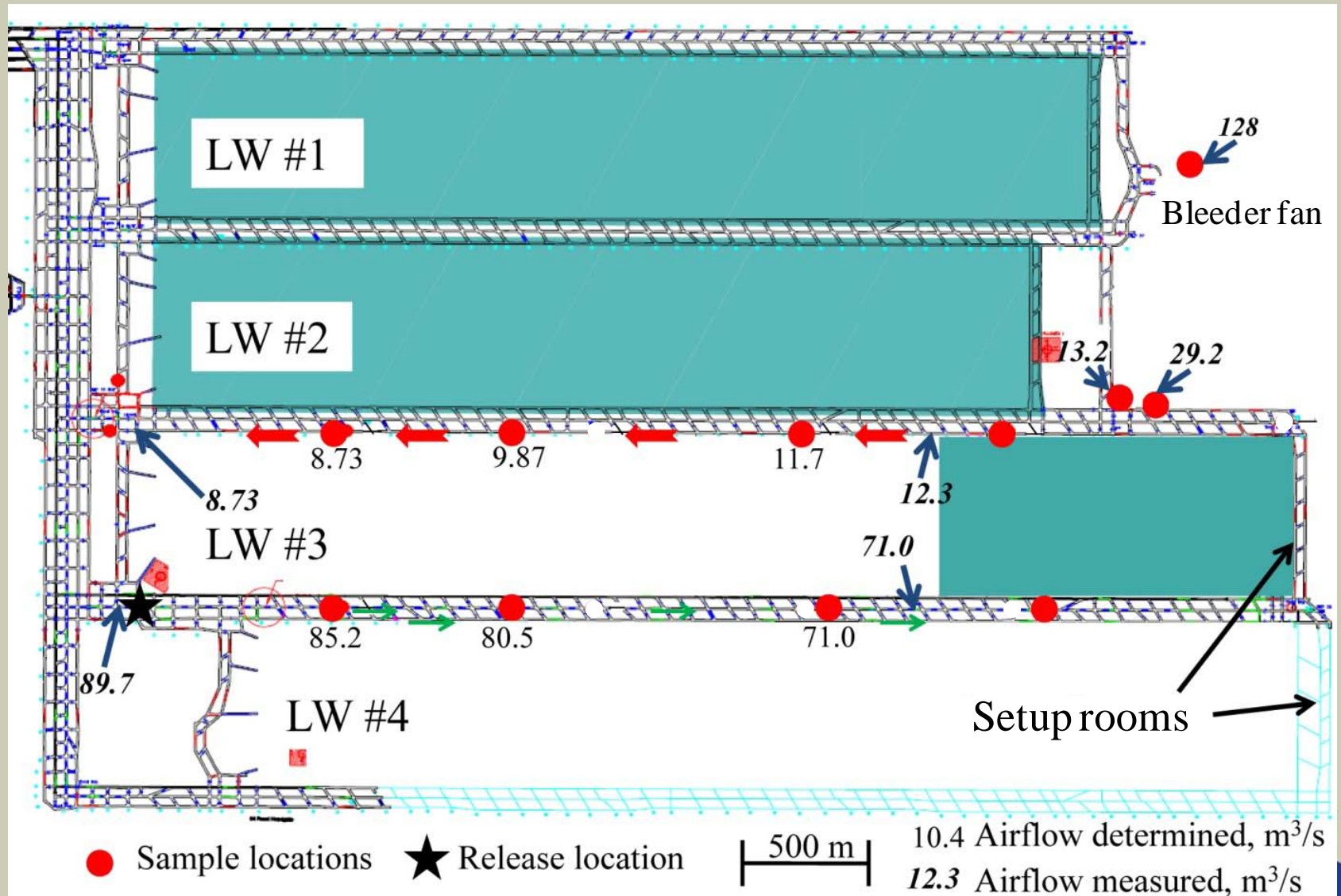
T_t = duration, min



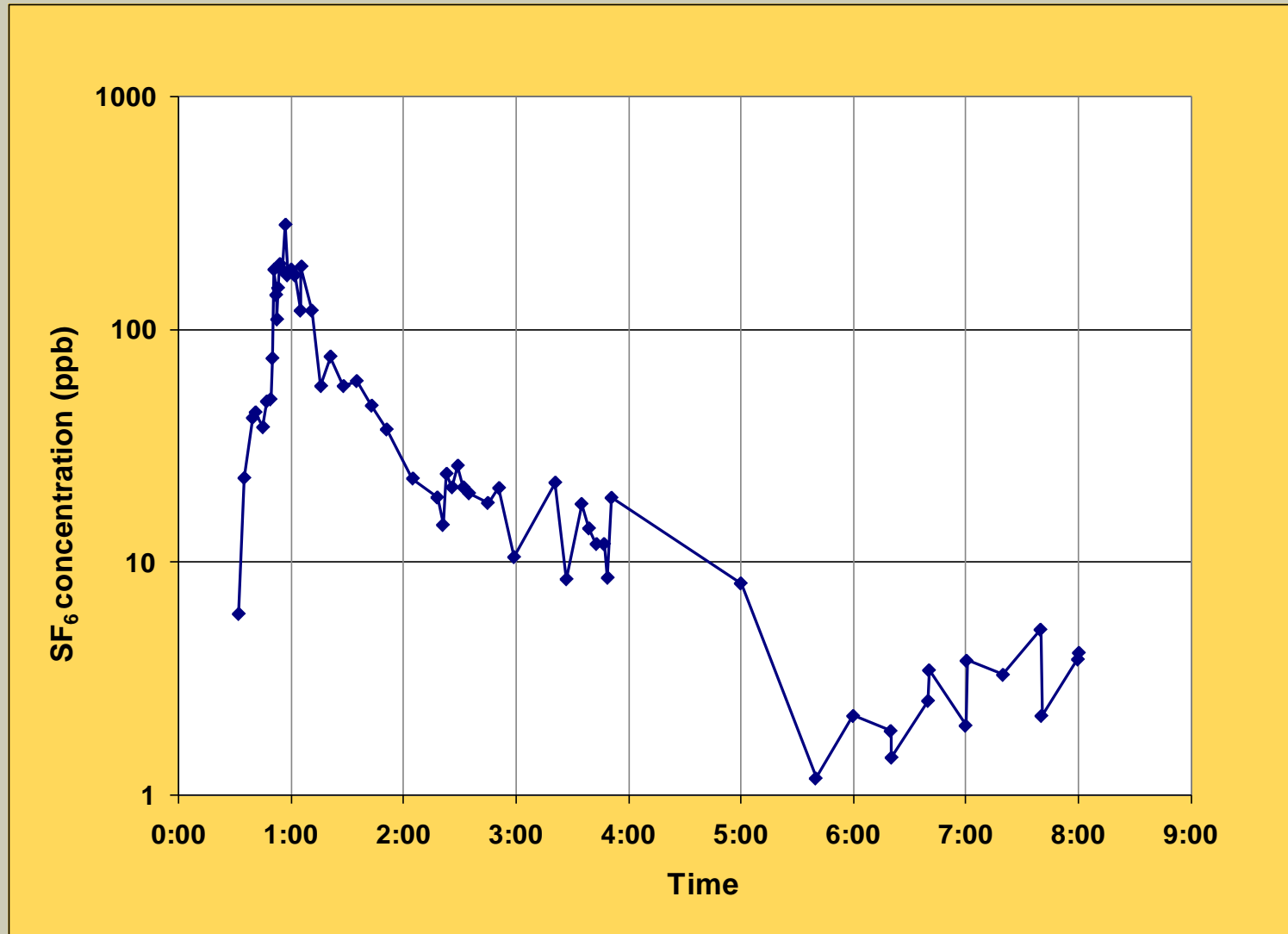
Thimons and Kissell, 1974;
Hartman et al., 1997



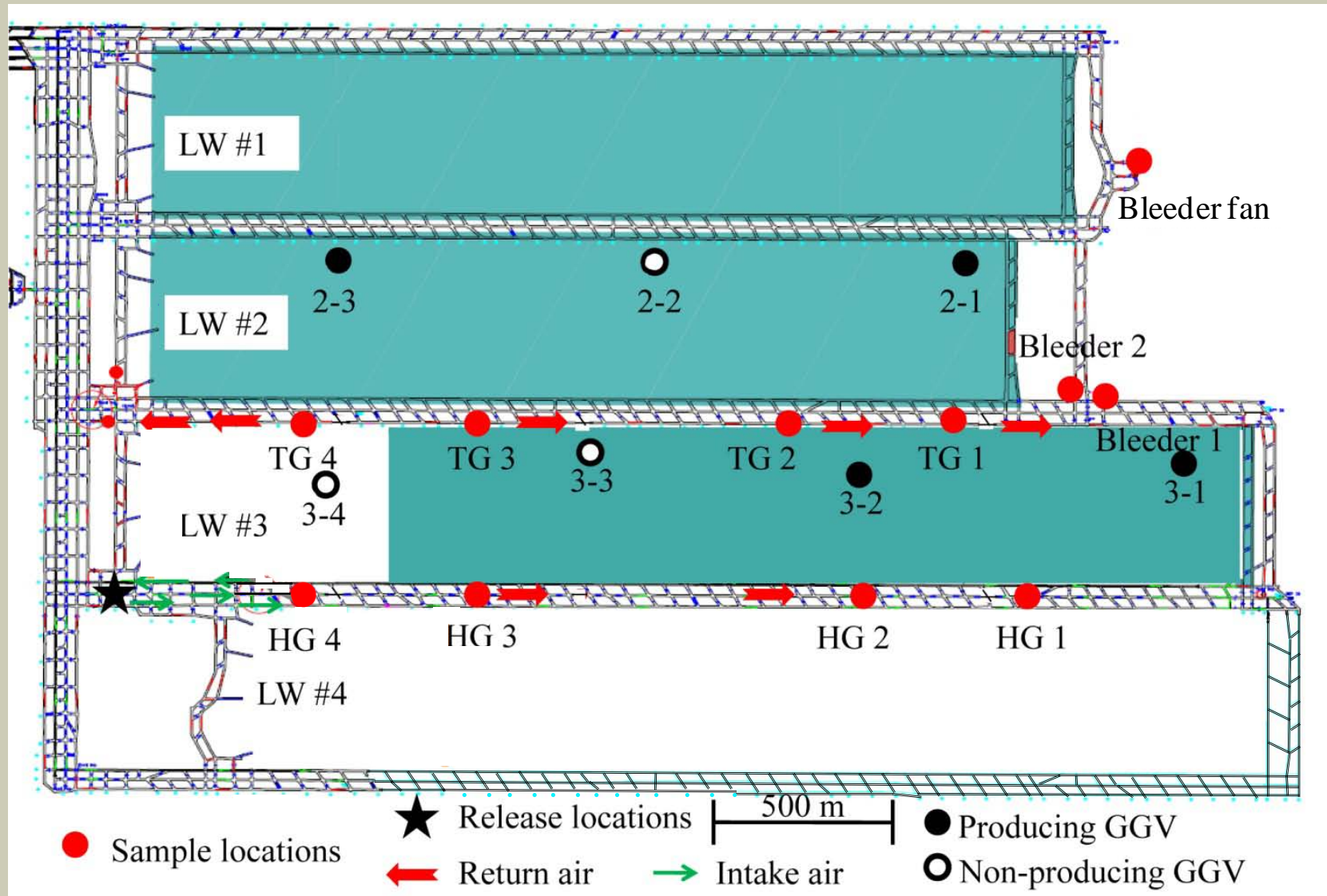
AIRFLOWS-TEST 1



TEST 1 BLEEDER FAN SITE



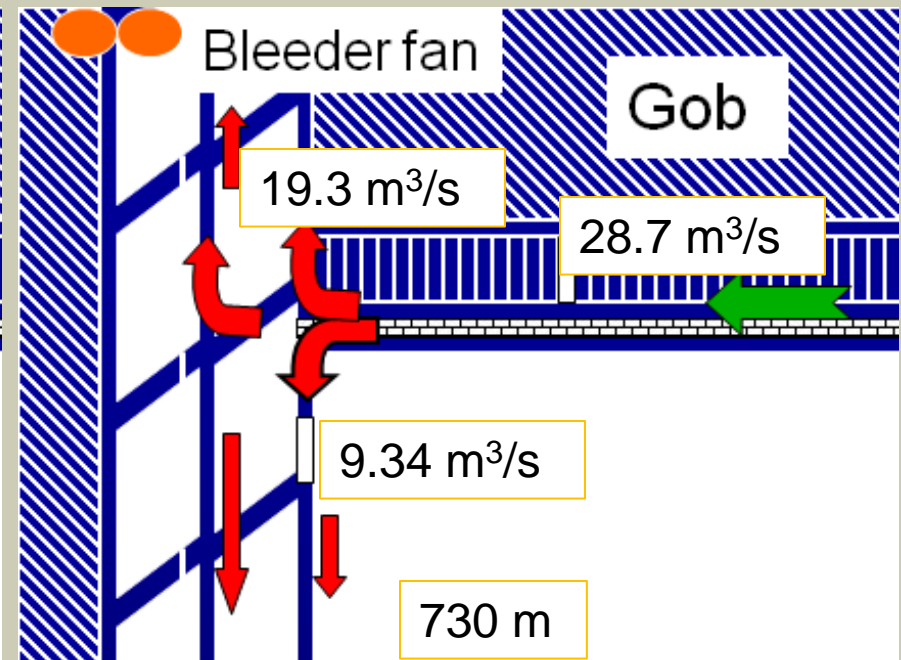
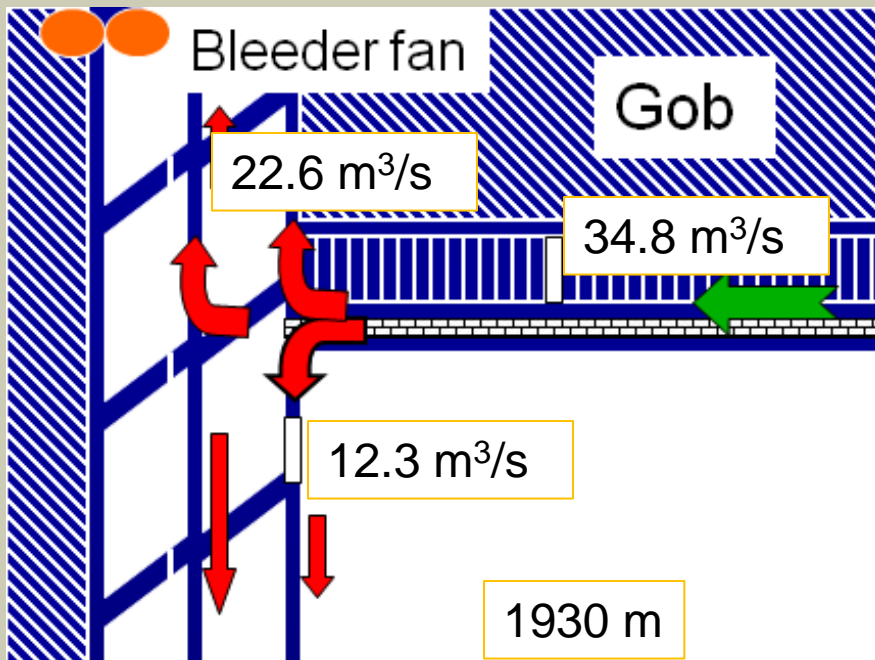
TEST 2 CONFIGURATION



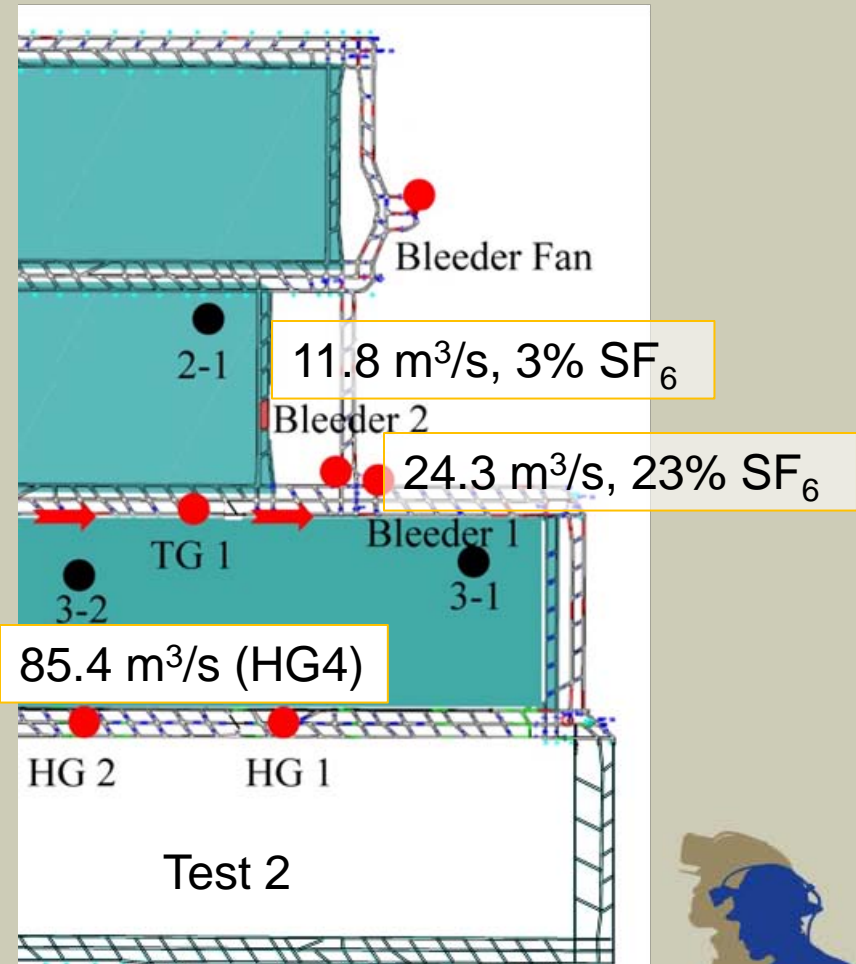
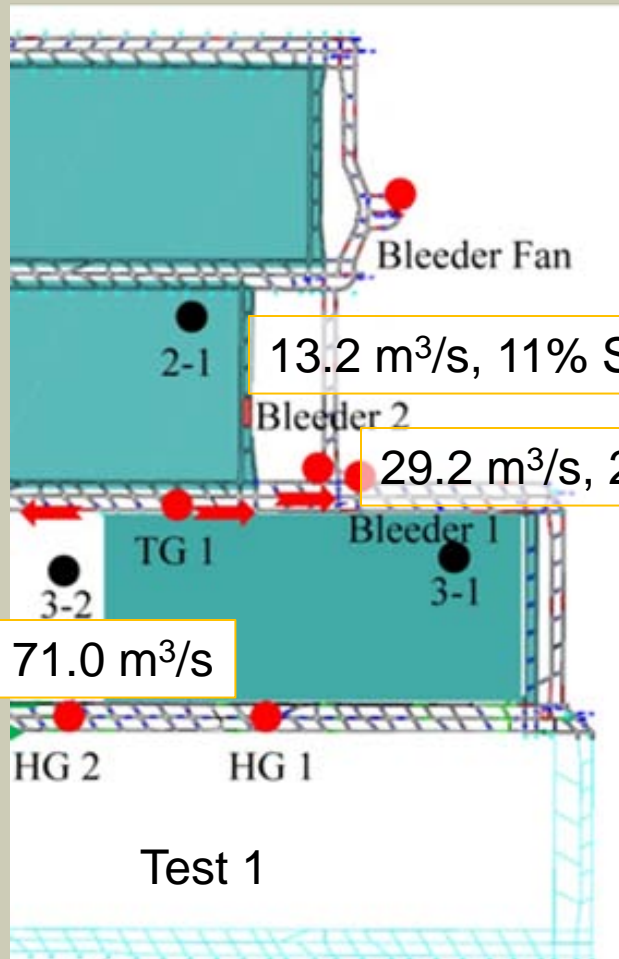
T-JUNCTION AIR DISTRIBUTIONS

Test 1, airflows about
2:1 inby:outby

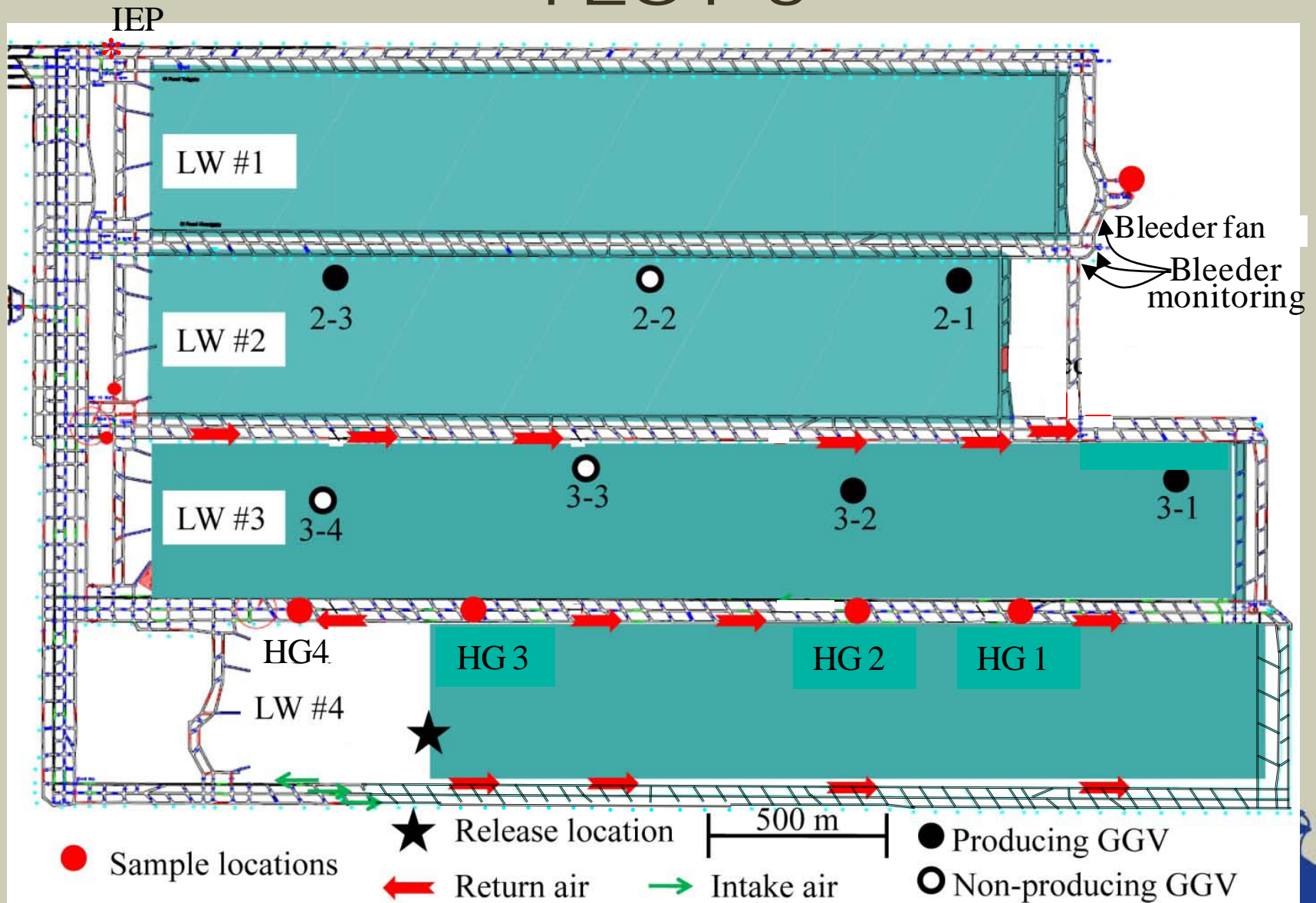
Test 2, airflows about
2:1 inby:outby



BLEEDER VENTILATION

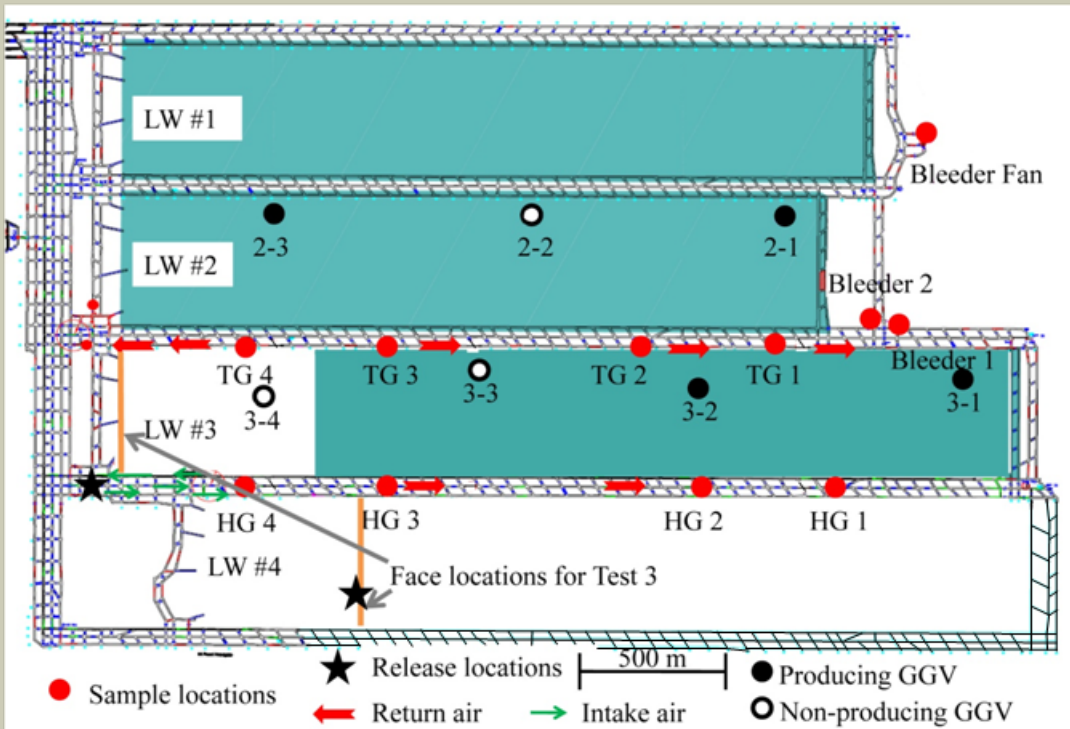


TEST 3

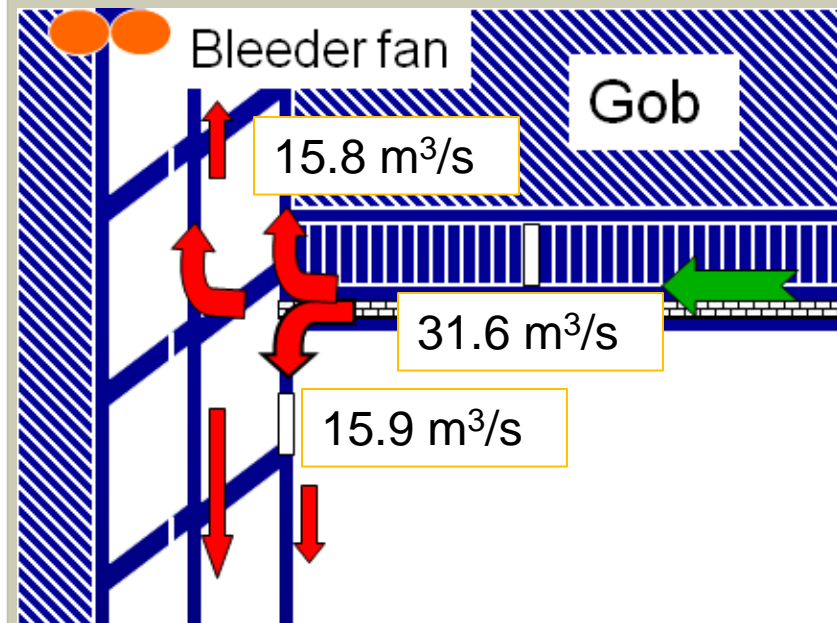


T-JUNCTION-TEST 3

Face locations



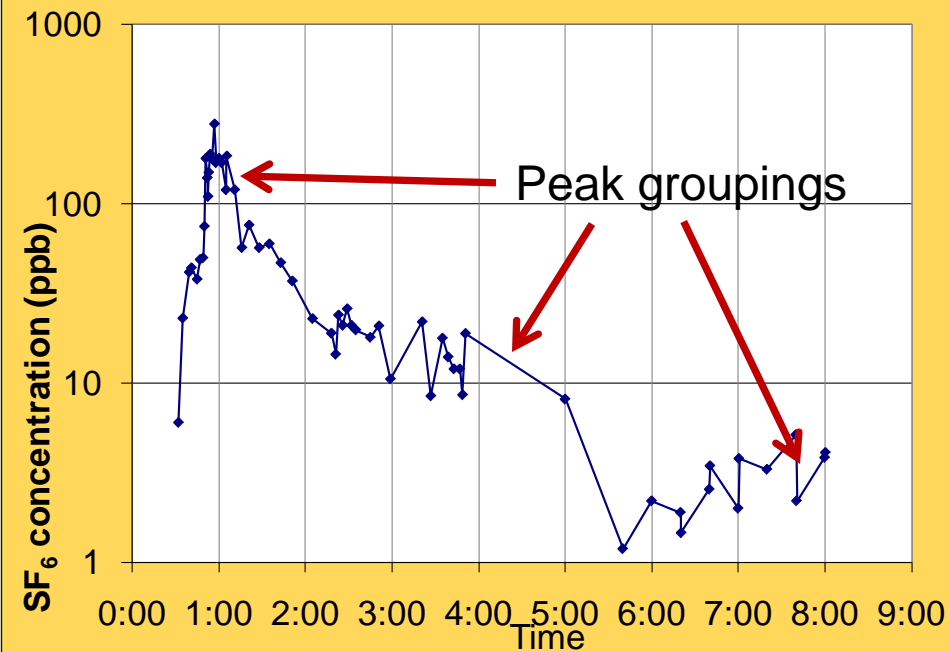
Test 3, airflows about 1:1 inby:outby



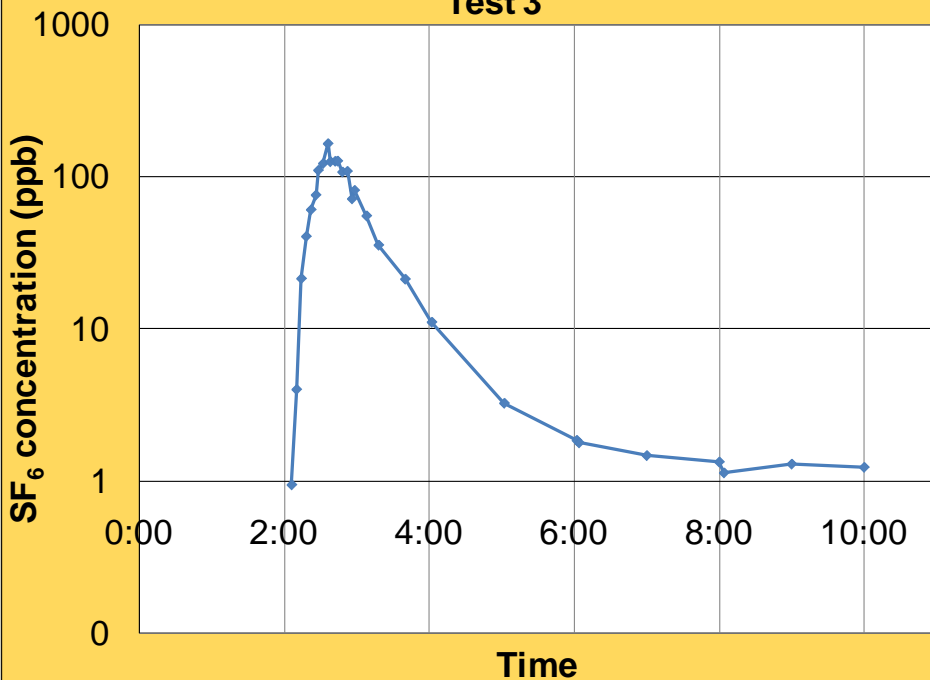
BLEEDER FAN SITE, TESTS 1 AND 3

– Movement of air masses to the bleeder fan

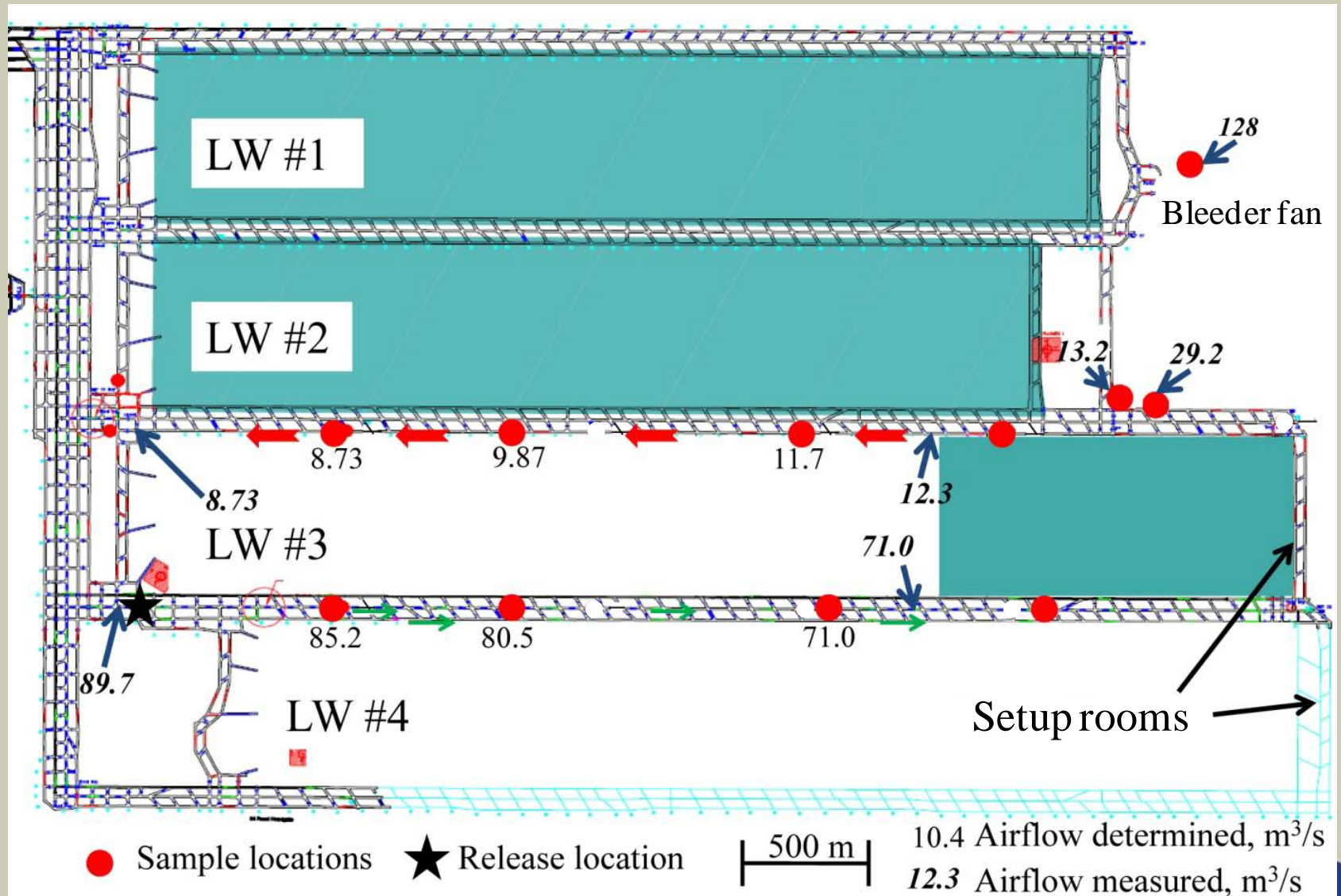
Test 1



Test 3



AIRFLOWS-TEST 1



SUMMARY AND CONCLUSIONS

- No tracer gas was recovered from any of the gob gas venthole monitoring sites.
- Tracer gas recovery in the bleeders accounted for 26% to 36% of the released gas while the study panel was active.
- Tailgate T-junction air distributions were estimated to be 2:1 for inby:outby flows on active study panel, ~15% less airflow in Test 2.



SUMMARY AND CONCLUSIONS

- Tailgate T-junction air distributions were estimated to be 1:1 for inby:outby flows in Test 3, the inactive panel test.
- Gateroad airflow losses inby the face increased as the face retreated and decreased the quantity of air reaching the bleeders.
- As face retreat increases the size the of gob, gateroad ventilation became mixed, homogenized airflow rates.



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DISCLAIMER

- The findings and conclusions in this presentation are those of the authors and do not necessarily represent the views of NIOSH. Mention of company names or products does not constitute endorsement by the Centers for Disease Control and Prevention



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- The Office of Mine Safety and Health Research is a division of the National Institute for Occupational Safety and Health (NIOSH) www.cdc.gov/niosh/mining
- NIOSH is a division of the Centers for Disease Control and Prevention within the Department of Health and Human Services www.hhs.gov

