

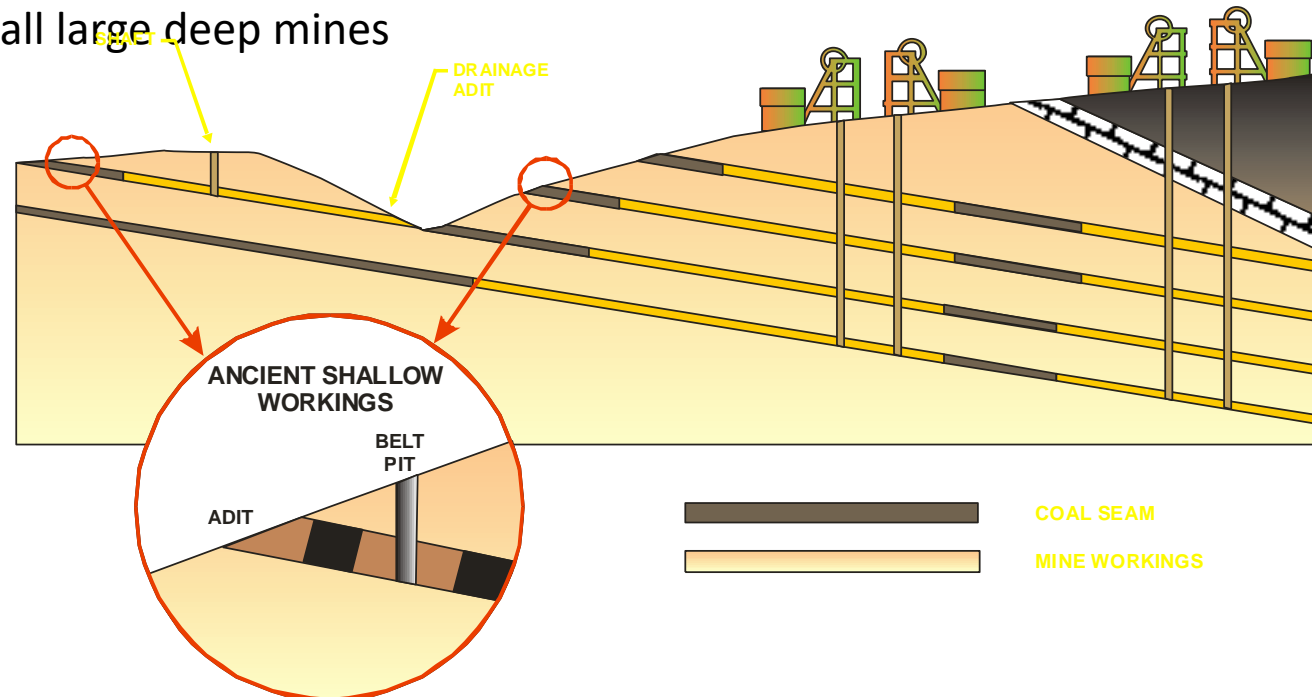
# **Management of coal mine closure hazards, UK**

Based on a mine closure study in the North Derbyshire coalfield circa 1988-1994

D P Creedy

# Introduction

- Coal worked from outcrop over many hundred years, going deeper and deeper.
- Mines linked for safety and operational reasons.
- Accidental connection through non-existent pillars with old workings which were either unrecorded or incompletely surveyed.
- Rapid closure programme of coal mines – not economic, sale to private sector where easy access to reserves until worked out, eventual closure of all large deep mines



# Timescale

- 1 January 1947 UK Coal Industry nationalised
- 1974 Plan for coal – modernisation, new technology, lower production costs, fewer jobs
- 1984/5 National miners' strike over colliery closures
- 31 October 1994 Coal Authority established to manage functions and liabilities to be inherited from British Coal after privatisation
- 1997 British Coal privatised
- 18 December 2015 - Last deep mine closed.
- From 1988 closure of mines led to problems of uncontrolled surface gas emissions
- From 1994 - opportunity for commercial capture of AMM for power generation and direct use – Coalgas (UK) (1994), Alkane Energy

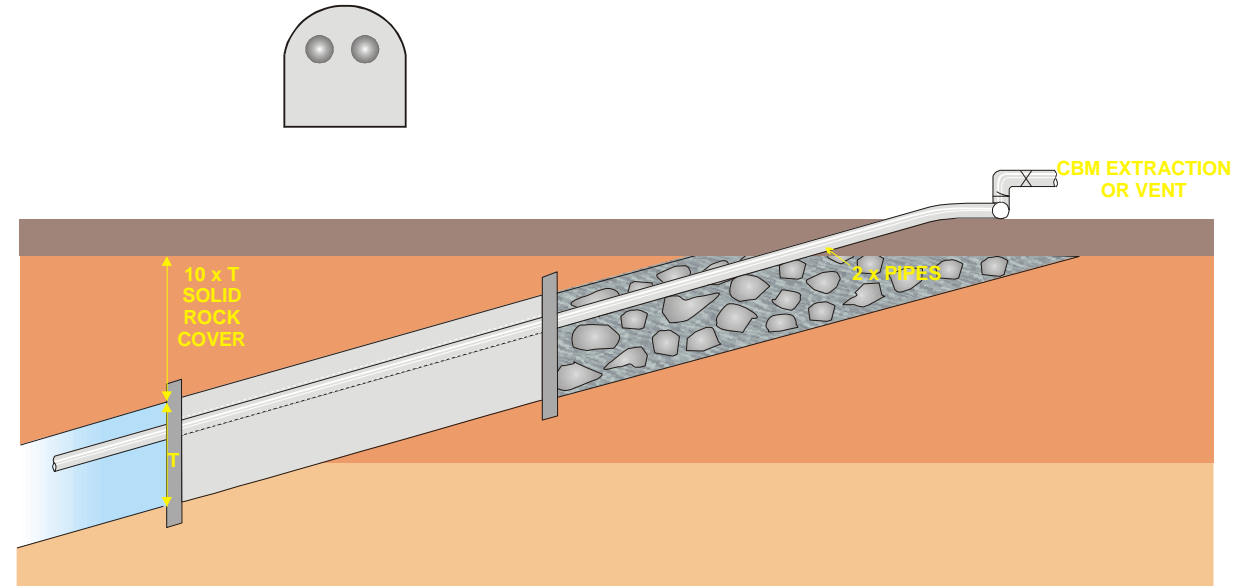
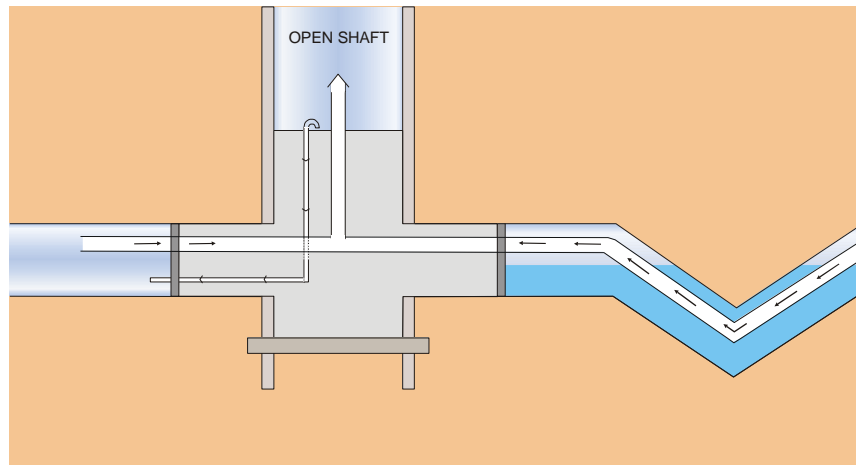
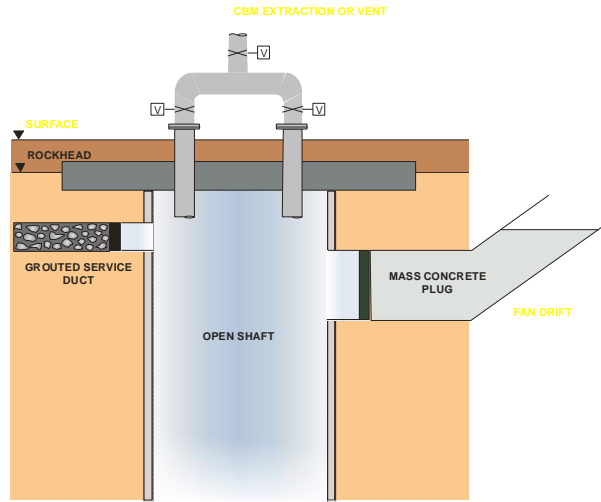


# Environmental hazards associated with mine closure

- Ground instability – subsidence of shallow workings, crown hole migration.
- Old mine entries- not all known, standards of sealing poor.
- Gas emissions at the surface -known occurrences – Arkwright closed 1988, emission in village (9 Nov 1988); fatality from blackdamp/stythe in north-east (1995); methane ignition in house in NUL (1999).
- Mine water discharges – iron rich water damaging to the environment (reed beds installed in critical areas)
- Ground water pollution – rising mine water entering aquifers if shaft not sealed and plugged
- Unsafe surface structures – buildings, service ducts, fan drifts –demolished and sites made safe.
- Contaminated land – coal, oil and chemical residues – excavated and removed to licensed disposal sites
- Combustion and fires – colliery spoil reworked, fires treated and extinguished where occurred.



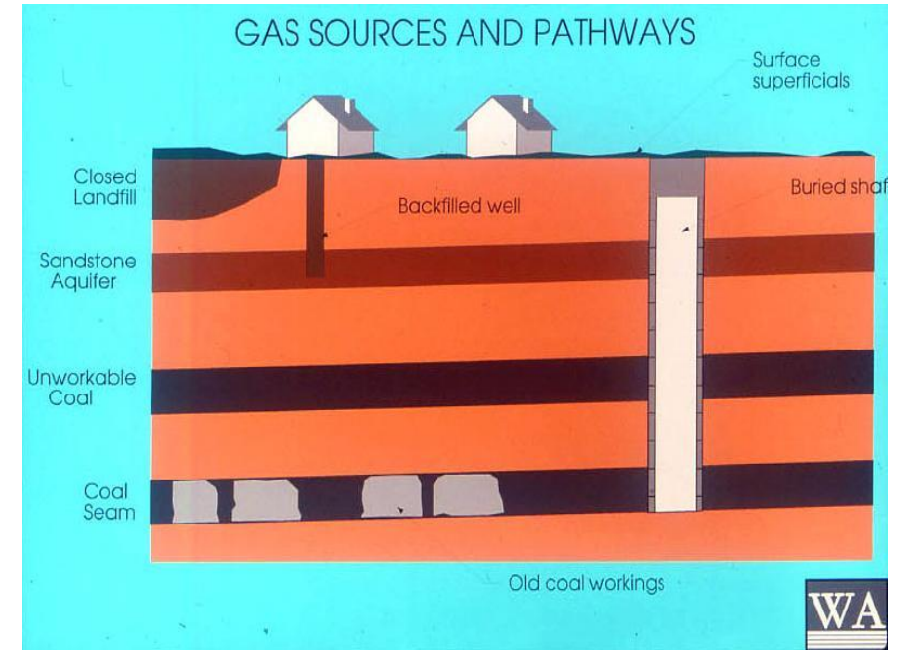
# Engineering closure design



# Major gas and water risks due to whole coalfield closure

Cessation of all dewatering – hydrostatic head increasing across pillars, risk of uncontrolled water movement and discharge at shallow outcrops, contamination of aquifers and sudden inrush in any remaining deep mines.

Last main fan switched off – suction exerted over wide area suddenly removed leading to rapid migration of gas towards old shallow workings and outcrop. Gases can be asphyxiating and/or flammable.





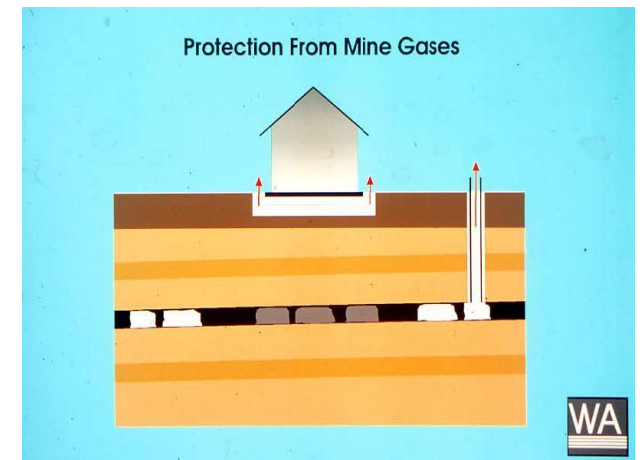
# Control measures to protect the public

- Desk studies and site investigation prior to final closure – gas and water
- Maintain water pumping where necessary
- Implement water treatment at identified discharge locations
- Install passive gas vents, flame traps and implement monitoring schemes to mitigate uncontrolled migration and escape of mine gases.



# Measures to facilitate safe coalfield redevelopment

- Mine closure investigations and control measures
- Land redevelopment control procedures embedded into planning applications – coal mining risk assessments
- Gas precautions in buildings
- Coal Authority responsible for managing residual liabilities of the former British Coal on behalf of the government.
- Extraction of AMM post closure requires the permission of the Coal Authority and a petroleum licence from the oil and gas authority.





# Regulatory authorities

- Planning – local and regional, mineral planning guidance.
- Environment Agency
- Environmental Health – public incidents
- Coal Authority
- Oil and Gas

# Economic and social measures

- Homes and Community Agency's (HCA) National Coalfields Programme, the Coalfields Regeneration Trust (CRT) and the Coalfields Enterprise Fund (CEF). Coalfield Regeneration Review Board, Sept 2010.
- <https://assets.publishing.service.gov.uk/media/5a74c35740f0b619c865a3de/1728082.pdf>
- The Coalfields Regeneration Trust, established in 1999. An independent charity, support communities, create opportunities
- Local Enterprise Partnership
- Twenty years on – strong recovery of employment but not in full, variations between areas, hidden unemployment (e.g., those with disability benefits excluded from stats).