

Maintenance, Monitoring (Using Infrared Technology) & Management of Methane Drainage Systems to Provide Optimum Gas Purity

Green Gas Approach



Introduction

This presentation illustrates that gas purity improvement relies on integrated optimisation of drainage system maintenance, monitoring and management. Possibility of modifying existing aspects of the drainage system and new practices to achieve high gas purity are discussed. The presentation further discusses the benefits that are gained by improving gas purity in the drainage system.



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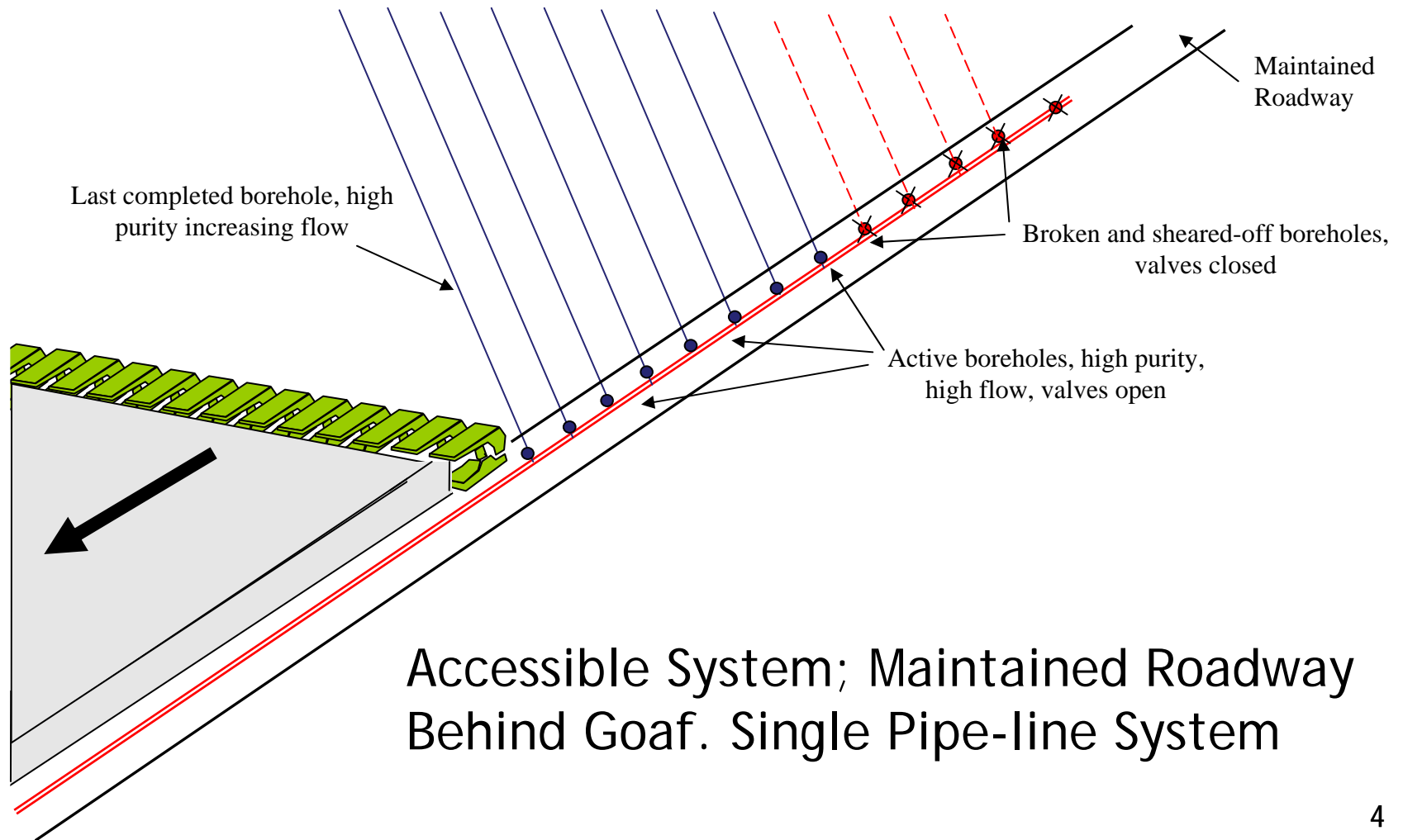


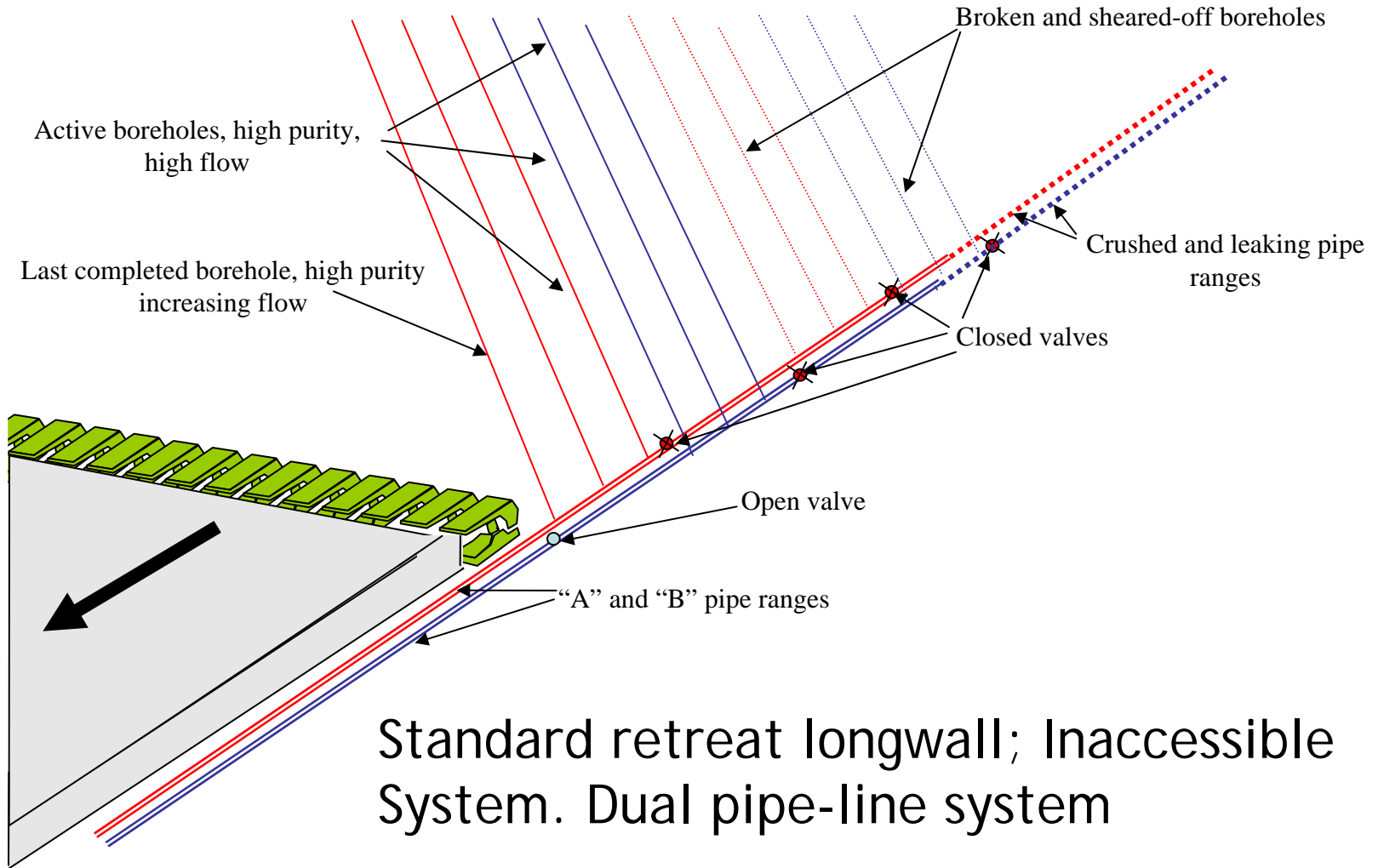
Section One: Current Situation Observed

- Permeability levels
- Gas quantity / quality
- Low purity (5%~20%) drainage practices
- Common methods of drainage
 - Boreholes drilled into broken zone above goaf
 - Sewer pipes
 - Sealed drainage galleries (sewer gates)
 - Drainage galleries (cross-measure drilling)
- Summary



Section Two: Selection of Drainage System





Standard retreat longwall; Inaccessible System. Dual pipe-line system



Section Three: Installation Standards

a) System Capacity/Design

- Ensure surface pump specification is adequate
- Ensure the capacity of the drainage pipeline is optimum and correct valves, measuring sections & regulators are installed in the pipeline
- Ensure borehole sizes are optimum

b) Pipeline Installation

- Avoid leakage of air into the pipe range
- Ensure water-removal system is available in the pipe-range
- Monitor the gas stream for pressure, flow and purity



c) Boreholes

- Target the correct area for optimum gas drainage & drill from safe location
- Drill & seal boreholes to the correct standards
- Test bore hole on completion

d) Connections to main pipeline

- Ensure flexible hose connections are leak free
- Ensure flexible hoses are undamaged

e) Roadway Support

- Improved roadway support results in longer borehole life



Section Four: System Maintenance

a) Use of Monitoring Systems

- Provides “real-time” information on the drainage system
- Monitors the system efficiency, flow rate, pressure and purity levels & alarms when system has problems
- Identifies area of system fault & reduces investigation/repair time

b) System Access

- Longwall roadway ventilated and maintained
- Restricted access to boreholes
- Out-bye system



c) System Measuring Points

- Manual monitoring
- Automatic monitoring

d) Basic Examinations

- Undertake tests at key points on the drainage system
- Regular examination of borehole hoses
- Regular examination of pipeline in face roadway
- Periodic examination of pipeline in trunk road
- Emergency maintenance undertaken when problems are identified (monitoring system)



Section 5: System Monitoring

a) Ideal monitoring locations

- Main pipe-line at surface pump-house / shaft side
- Out-bye end of each longwall pipeline
- Major trunk road junctions

b) Type of system

- Complete integrated monitoring system
 - Methane purity
 - Flow velocity
 - Suction pressure
 - Gas analysis



System components

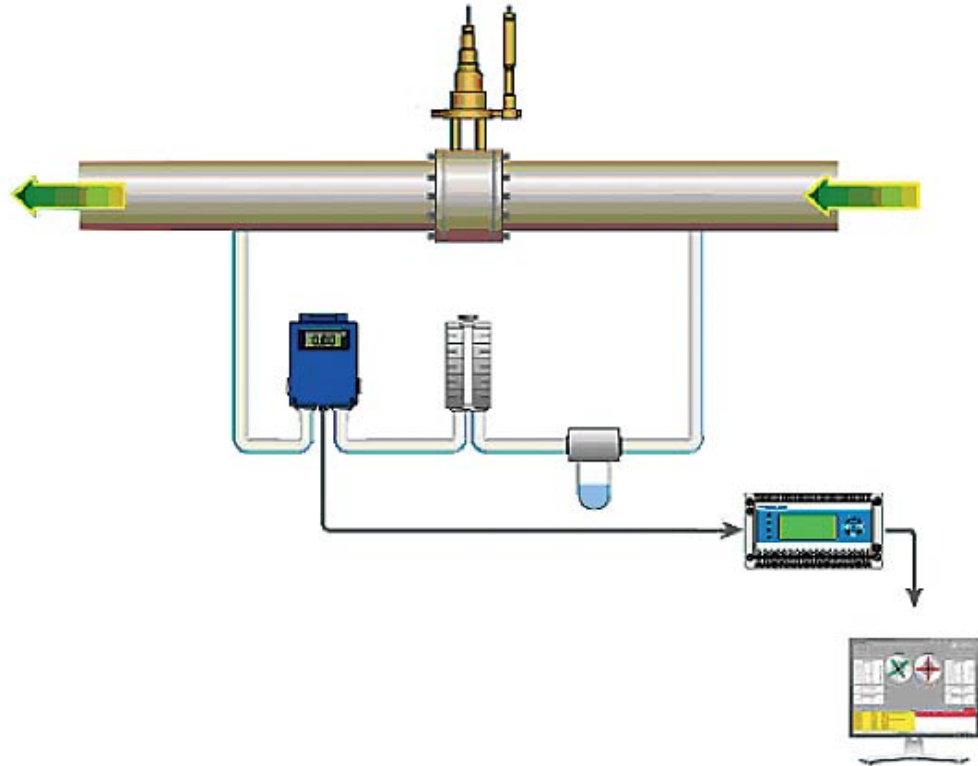
- Analysing unit
- Transducer pipe-section





d) Operational details

- Protective devices
- Transducer signals
- Local analysis
- Gas "finger-print"
- Local PLC





e) System advantages

- Real-time monitoring and recording
- Accurate analysis of Gas sample



Section 6: System Management

a) Management commitment

- Senior management involvement
- Management structure and system utilisation
- Provision of manpower & equipment

b) Methods of Work

- Introduce written instructions for standard tasks
 - Installation of boreholes
 - Installation and sealing of borehole standpipes
 - Connection, testing and control of boreholes
 - Testing and de-watering pipe-lines



c) Responsibility and ownership

- Encourage job responsibility throughout the drainage team
- Create team atmosphere and foster pride of ownership
- Ensure workplace is inspected regularly by management



Section 7: Benefits of High-Purity Gas

a) Safety

- High-purity gas in the drainage pipeline
- Increased gas drainage (flow) ~ less gas at the working area
- Fewer and less severe peaks in mine gas concentration
- Reduced gas outflows during barometer changes
- Reduced dependency on ventilation for gas dissipation
- **Creates safer underground working conditions**



b) Increased Production

- Attention to the purity of the drainage system also results in improved gas flow rates reducing stoppage time caused by excess gas on the longwall and allowing increased production





c) Lower System Operating Costs

- Reduction of mixture in the pipeline reduces the running costs of the pumping system
- Reduced flow requires smaller pipelines and reduces pipe costs

d) Improved Utilisation

- Increases generator operating hours due to the good quality gas supply thus increasing revenue





d) Improved Utilisation (continued)

- When linked with improvements to the drainage system, provides a constant gas supply helping to avoid engine “hunting” and help maintain the correct engine inlet fuel/air mixture.
- Reduces the risk of sudden engine trips due to low purity gas supply

Green Gas International would welcome the opportunity to use their international experience combined with the local knowledge of the mine, to design and manage the optimal degasification system