

**Durham Miners Heritage Group
Information and Activities Package**

Teaching Notes

The Future of Coal Mining

A problem with coal mining is that, in its traditional form, it is dangerous and dirty. There is, however, a way of using coal as a fuel (rather than as a raw material for the synthesis of plastics, fibres, pigments, drugs, *etc.*) without the need for people to actually go underground and mine it. The process is called underground coal gasification.

'Coal gas' or 'town gas' used to be made by baking coal in ovens with a limited supply of air. The result is a mixture of carbon monoxide, hydrogen and methane (known as 'producer gas'. This reaction releases heat, and therefore tends to 'run away'. A way to overcome this is to pump steam through the coal. The steam reacts with the hot carbon in the coal to form carbon monoxide and hydrogen (traditionally known as 'water gas'). The reaction of hot coal with steam is 'endothermic', that is to say it absorbs heat and is therefore not self-sustaining, but a mixture of air and steam is. There is no reason why this process cannot be carried out underground, removing the

need to mine the solid coal at all. In this process, an underground fire is started at the coal face, serviced by two bore holes. Down one of these is pumped a carefully regulated mixture of air and steam while the usable, inflammable gasses formed are extracted by way of the second bore hole. These can then be used as a conventional fuel to generate electricity by way of conventional steam turbines.

This technique, known as *in situ* gasification, was actually invented in County Durham in 1912 but was not pursued here, the technology of the time not being adequate. It was the Soviet Union that subsequently developed the process. Should such technology prove economic it would enable the utilization of coal in seams previously considered unminable, either because they are only centimetres high or because they are inaccessible. For example, the huge coal reserves underneath the southern North Sea.

An experimental plant, the result of a multinational collaboration, has been operating with some success near Brisbane, Australia since 1999.