

GAS IN SEDIMENTS

Gas occurs in sediments and may cause concern in underground construction. Its presence may change the way in which the construction must be undertaken. It may force the use of pre-drainage or flame proof and intrinsically safe equipment.

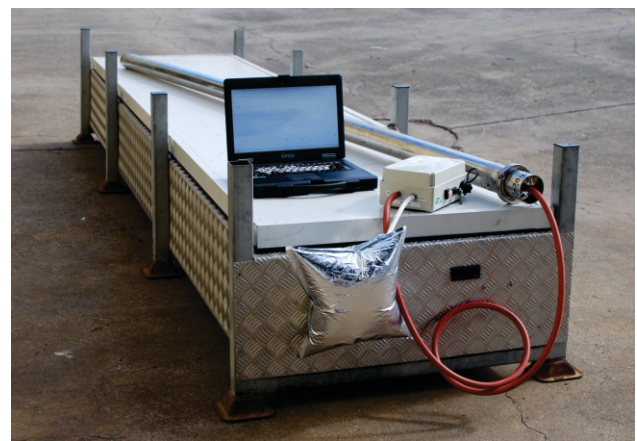
Sigra has been dealing with gassy sediments for a quarter of a century. Its involvement has been in coal mines, natural gas reservoirs and more recently in tunnelling, both in rock and in soft muds. The key to dealing with gas is to know what types are present in what quantity and at what pressure. It is also necessary to understand the diffusional behaviour and permeability of the sediments so that the rate at which they enter underground excavations may be estimated. Sigra has the equipment and techniques to undertake this.

Gas Content and Diffusion

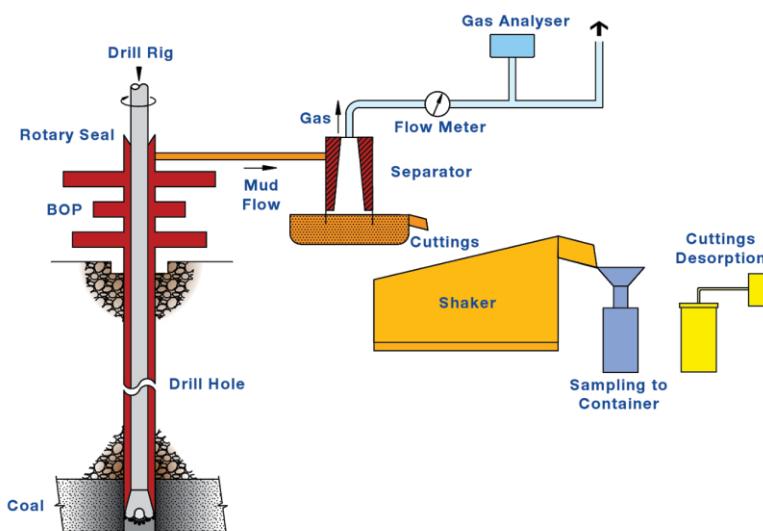
Sigra has three means to determine the gas content of sediments:

- **Gas content from core desorption:** This involves placing core into a desorption vessel and measuring the gas release with time. Lost gas is obtained by extrapolation of the desorption behaviour and residual gas is released by crushing the core.
- **Gas capture core barrel:** This is Sigra's variant of a HQ wireline coring system. It captures all the gas during coring and on retrieval of the core.
- **Gas content while drilling:** This enables all gas contained in the strata to be captured and volumetrically measured during open hole (non-coring) overbalanced drilling to provide gas content per unit volume of sediment.

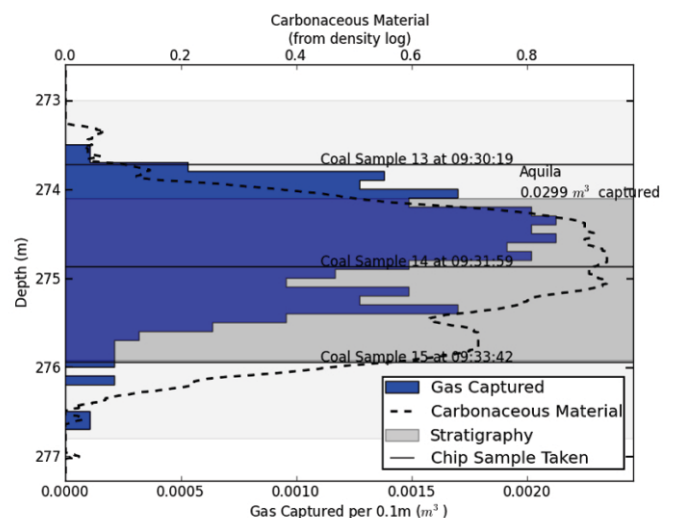
The diffusional behaviour of the rock drilled may be determined during each of these procedures.



Core desorption for gas content



Gas content while drilling



Gas measured while drilling

Gas Content and Sorption Pressure

Gas is stored in pore space and by adsorption in carbonaceous sediments. The relationship between the adsorbed gas and the gas pressure is called the sorption isotherm. Sorption isotherms may be determined for a single gas by laboratory testing. Where mixed gases are present it is more reliable to use Sigra's Native Sorption Isotherm procedure. This involves measuring the gas release and pressure stepwise during the initial desorption phase.

Permeability and Pressure

To be able to determine the flow of gas and fluid through sediments it is necessary to undertake flow and pressure measurements. Sigra uses Drill Stem Testing (DST) and pulsed DST testing from surface for this purpose. It also has underground test techniques to measure these parameters.

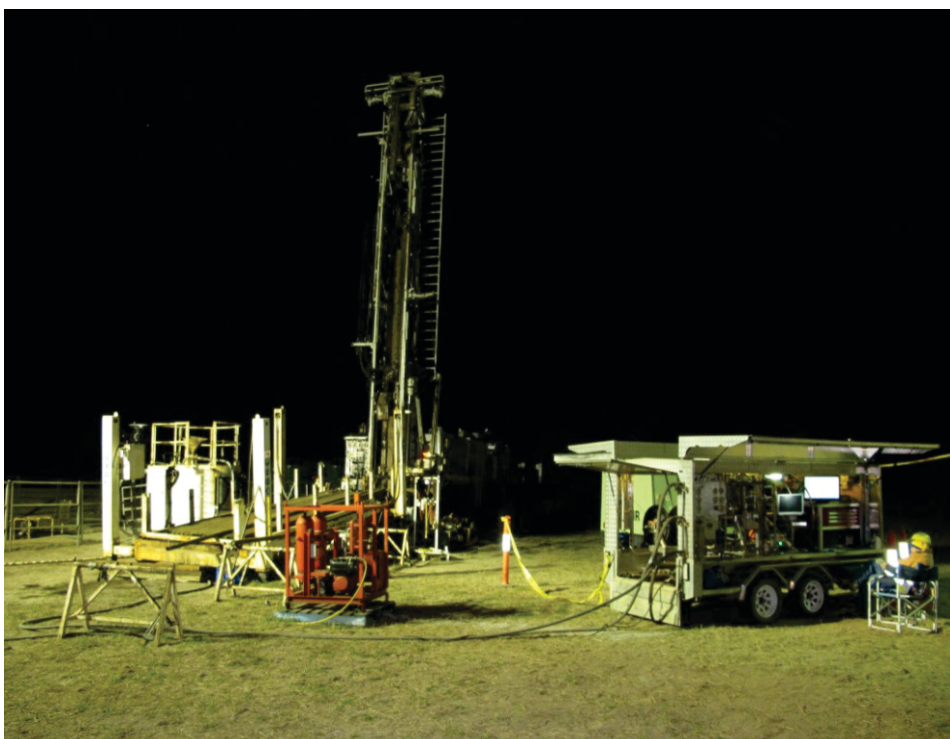
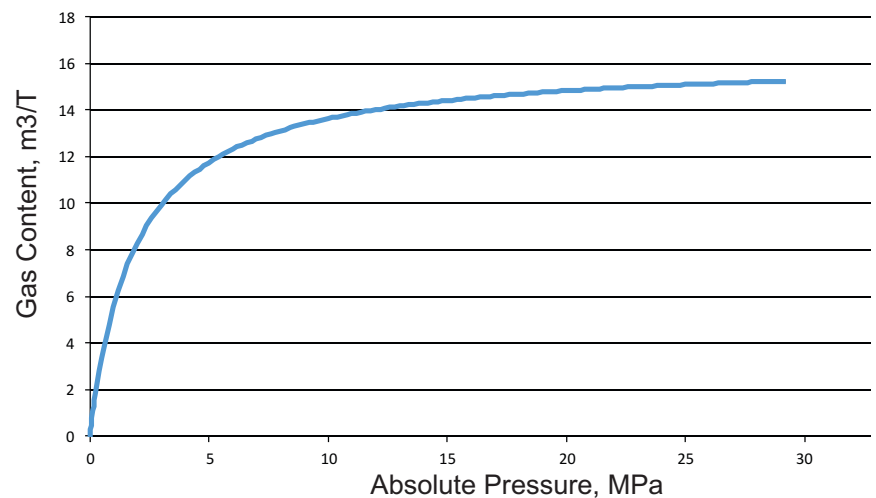
Gas and Water Drainage

Sigra can design gas drainage systems to pre-drain areas to be tunnelled or mined. This design process involves modelling the behaviour of the strata with a two phase (gas and water) simulator. Sigra can then practically design the drainage layout and hardware required to do this.

Ventilation Requirements

If gas is present in the strata then the ventilation must be carefully considered. Sigra have the capability to predict gas make into excavations and to design a suitable ventilation system.

NATIVE ISOTHERM



Drill stem test for permeability