GeoGAS GAS CONTENT TESTING

SURFACE DRILLING LOST GAS (Q1) TESTING MANUAL

from Procedure Manual V 6.0

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AIM OF THE DOCUMENT

The procedures and standards outlined in this manual are to facilitate:

Correct and efficient use of gas testing equipment.

A predictable outcome in terms of accuracy and reliability of testing.

Personal safety and the protection of property for both GeoGAS and client organisations.

TERMINOLOGY

The following basic definitions apply.

- **Measured gas Content (QM) –** The sum of Q_1 (lost gas), Q_2 (measurable gas) and Q_3 (residual gas).
- **(Q_1) Lost Gas** – Gas lost from the sample, subsequent to it's being removed from it's in situ position and prior to it's containment in the gas canister; expressed as the quantity per unit mass of coal.
- **(Q_2) Measurable Gas** – Measurable gas desorbed at atmospheric pressure from the non-pulverized coal sample; expressed as the quantity per unit mass of coal.
- **(Q_3) Residual Gas** – Gas still contained in coal at one atmosphere of seam gas, expressed as the quantity per unit mass of coal.
- **GeoGAS DRI** - A measure of the rate of gas desorption during crushing of the coal sample, corrected to the Q_m of the sample. (The gas volume generated after 30 seconds of crushing a 200 g sample corrected from the "Q_3 - Residual Gas" value to the Q_m value).
- **IDR-30 INDEX** - a measure of the initial rate of desorption. The index is calculated by dividing the quantity of gas given off in the first 30 minutes after coring, by the sample mass.
- Results are reported to 20°C and 101.3 kPa.
- **CH4 RATIO** - The ratio of methane (CH4) to methane plus carbon dioxide (CO2).

  ie CH4 ratio = CH4/(CH4 + CO2)

- **ARD** - Apparent relative density.

  ie. ARD = mass in air/(mass in air - mass in water)

SURFACE CORING LOST GAS MEASUREMENT

Lost gas measurements are used to define the rate of gas desorption immediately after sampling. This enables calculation of the volume of gas which is lost between the commencement of desorption and the time when the sample is first contained.

For surface boreholes, the commencement of desorption is (by convention) the mid point between when the core was pulled off the bottom of the hole, to when it reaches the surface**.**

An air tight receptacle, or "gas canister", is used to contain the coal sample and to control the gas. Gas from the canister is fed into an inverted measuring cylinder and periodic measurements of the water displacement are recorded.

Equipment List

sampling	tape measure bucket and clean water brush
recording	Surface Bore Q1 Data Sheet clipboard pen
lost gas gear	one or more 2 litre measuring cylinders and fittings stand and clamp basin and water squeeze bulb gas canister(s) time piece thermometer (optional) barometer (optional) electrical tape silastic sealant clean rags
safety gear	eye protection ear plugs hard hat safety boots/shoes

PROCEDURE

Setting up

Find a safe locality to set up measuring equipment, close to the drill rig but not in a hazardous position.

Note: If high CO2 is expected it is <u>not</u> necessary to use an acidified brine solution to minimise CO2 solution. The test time is sufficiently short to make any CO2 loss insignificant.

Make a level platform for the measuring cylinder stand. (If possible set up the cylinder and bath on top of a drum or box - readings can be taken with greater ease and accuracy).

Leak Check

The following leak-check procedure should be conducted at least 15 minutes prior to coring.

Prop the canister up so that there are no fines or dust around the cap.

Assemble measuring cylinder, stand and bowl (filled with water). The measuring cylinder is inverted into the basin of water. The gas is fed in through the top. Make sure the configuration is stable.

Undo lid and remove the splits from the canister and stand them nearby. Re place lid.

Attach the cylinder to the canister. Open the valve on the canister cap. Using the squeeze bulb draw water up into the cylinder. Set water level at 200 ml. Close valve to squeeze bulb.

Check for leaks. Over a period of at least 5 minutes the water level should not change (be aware that the sun and passing clouds can cause minor changes in temperature which translate to changes in the cylinder water level) . Any leaks should be fixed before coring using silastic sealant.

Prior to the core run, turn canister valve off and unscrew the lid. Water level should remain at 200 ml. Keep cap loosely on the end of the canister, not on the ground or exposed to dust and fines, until core is placed inside.

Pre-coring checks

Check that core barrel, splits and core lifter are clean and in good condition prior to use.

Try to predict depth at which coal is to be sampled. Use nearby borelogs or geological model information where available. This will assist with predicting when to record coring times if multiple core runs are used.

It may be desirable to shorten the drilling run above the sample run, in order to optimise the intersection of the target seam. (eg. coring 2 m seam with 3 m core barrel - it is best to intersect the coal in the middle of the run if possible)

Ensure that hole is flushed until water return is clear of fines.

Coring

Record date, borehole number, sample depth, temperature, etc on the GeoGAS "SURFACE BORE DATA SHEET". Be sure to accurately record time off bottom and time at surface.

Quickly retrieve the core barrel from down the hole. *It should take no more than 30 minutes from the end of coring to the time of the first measurement (ie if the hole depth is not very deep and there are no unforseen delays). If long delays are encountered be sure to make a clear description of events on the formatted data sheet.*

Where coal is very broken, select the most intact section of core from the core barrel.

Sample must be recognisable as core. Fines may be packed into the barrel and have the appearance of core. Test by probing the core to make sure it is solid.

When coal emerges from splits it may be desirable (eg if client requires coal to be used later for washability testing) to quickly wash excess drilling mud from the sample(s). THIS MUST BE DONE VERY QUICKLY. Use clean water and a soft brush, and be careful not to brush away loose coal fines.

If several samples are to be taken, try to sample coal and other gaseous lithologies. For example, fill one canister with coal, another with carbonaceous mudstone, another with coaly mudstone, etc. This will help define the gas content / ARD relationship. The sampling strategy will depend on client requirements - beyond the scope of this document.

Make a quick sketch of sample positions and lengths. Label with run number and depth at end of run.

Record coring times

For surface boreholes, the commencement of desorption is the mid point between when the core was pulled off the hole bottom, to when it reached the surface.

All activities must be conducted as quickly as possible (no need for panic) from the time the core is cut to when it is sealed in the gas canister.

Handling the Sample

Recover the core from the core barrel.

Place core in the "splits" which have already been removed from the canister.

Tape both ends of the splits to prevent coal falling out, and tape once in the middle. Note: Do not tape excessively as this can lead to jamming of the core in the canister.

Put splits containing sample into the canister, ideally with the base of the core in the base of the canister so that the coal is vertically positioned as it was in situ. Mark the splits indicating the top and base of the core.

Wipe any debris from neck of the canister.

Check that o'rings and threads on the canister cap are clean and free from fines and dust.

Screw cap completely on the canister and open valve immediately.

Recording Measurements

Record water level. (It will drop 100 ml to 200 ml immediately).

Start gas desorption test on the next full even minute ie 8:01:00.

Record water level every minute for the next eight minutes then every two minutes for another ten minutes. The GeoGAS Q1 sheet is formatted for these time increments.

Close valve on canister immediately after last reading.

If the sample is gassy and the water is likely to empty from cylinder before measurements are complete, record as many measurements as possible then close the canister valve.

After Testing

If applicable, Insert safety clip through the handle on the cap of the canister (with handle in upright position). Tape canister valve (tap) in the shut position. Seal outlet fitting with tape to prevent dust entering the fitting.

Place the completed and checked "SURFACE Q1 DATA SHEET" into a plastic bag, fold over, and attach to the top or side of the canister with tape.

Deliver the sealed canister to GeoGAS as soon as possible.

NOTE: Take personal care of gas canister. Protect the ends during travel. Leaks although rare can occur. The set up procedure minimises the risk.

GeoGAS Pty Ltd ***GeoGAS***

SURFACE BORE Q1 DATA SHEET

COLLIERY: _____ **DATE CORED:** _____

Test Conducted By: _____ **CANISTER NO.:** _____

DRILLER: _____ **Client Sample No.:** _____

LOCATION:

Borehole No.:
Seam:

CORE DESCRIPTION:

CORE DEPTH: **FROM** _____ **(m)** **TO** _____ **(m)**

SAMPLE LENGTH: _____ **(m)**

CORING TIME: **Tick**

TIME OFF BOTTOM		**TIME AT SURFACE**		**AM**
WATER START LEVEL		**TIME IN CANISTER**		**PM**

READINGS

MINS	TIME	READING	MINS	TIME	READING
0]	: :00		10]	: :00	
1]	: :00		12]	: :00	
2]	: :00		14]	: :00	
3]	: :00		16]	: :00	
4]	: :00		18]	: :00	
5]	: :00		20]	: :00	
6]	: :00				
7]	: :00				
8]	: :00				

COMMENTS: _____

_____

_____

Leak Test Completed: **PASS** **FAIL** **Tick**